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Scott Thompson-Whiteside is currently Acting Dean of the Faculty of Design at Swinburne University of Technology in Melbourne, Australia. Since 2005, Scott has been on the Faculty Executive as either Associate Dean International, a role he retains, or Deputy Dean. He has been responsible for a range of international activities within the faculty from recruitment, exchange, study tours, transnational education and internationalisation of the curriculum.

Scott has extensive experience in teaching and managing programs, departments and schools in the UK, Malaysia, and Australia. He currently teaches design management within the faculty and in 2006 won the Vice-Chancellor's teaching award for higher education.

Scott's PhD is from The University of Melbourne, Australia at the Centre for the Study of Higher Education. His PhD and research explores how the massification and internationalisation of higher education has changed our notion of how universities set, monitor and assess academic standards. His interests lie in higher education policy and management, internationalisation, transnational education and quality assurance.

Catherine Lee Cheng Kiat, an academic in linguistics and Teaching English as a Second Language, embarked on her teaching career as an English teacher upon graduation from a Teacher's Training College. She holds a Bachelor of Arts (Hons) in English Language Teaching, with special reference to ESP from the University of Birmingham, United Kingdom. Thereafter, she was attached to a Malaysian Polytechnic in Jitra, Kedah serving as an English lecturer in the General Studies Department. During her eight years there, she helped to develop Teaching and Learning Modules for Technical and Business English.

She obtained her Masters in English as a Second Language (MESL) from the University of Malaya, Malaysia and joined Taylor's University, School of Communication, Malaysia in 2005, after more than twenty years of service in the Education system. Her career at Taylor's started out as a Stream Coordinator for English Language in her faculty and she is also the Programme

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Her passion in teaching brings her to explore different platforms for a variety of classroom teaching. Her areas of interest in research include the use of blogs, social media platforms and enhancing learner autonomy in teaching and learning. She's currently involved in the pilot project for blended learning in the School of Communication, whereby, the use of social media platform is embedded in her teaching schedule to promote active participation for online discussion.

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Introduction

The understatement of the 21st century is that technology has changed our world. Education is scrambling to keep up with its students' use of technology and trying to "think outside the box" (which is becoming a normal thought process as well), concerning how to utilize technology for educational purposes. This inaugural issue of the IAFOR Journal of Education is dedicated to developing new methodologies and standards needed due to technology as well as how technology is being used in the classroom. The articles included reflect upon the theme of the Asian Conference on Education of "Learning and Teaching in a Globalized World". They address many different disciplines as well as explore how these different disciplines function technologically as well as globally. Since globalization has a direct connection to education, especially as technology has "shrunk" the size of the world, we do not think twice about referring to education as a global concept, rather than as an entity that belongs to a specific country. Education belongs to the world.

Thompson-Whiteside explores what standard based quality systems mean for the regulation of transnational education, particularly as it pertains to international partnerships with Australian universities. Universities collaborate world-wide and quality control is an issue. With different governing bodies for different institutions, how regulation is implemented has global implications. Regulation of transnational education will need people of vision.

Meenorngwar proposes a methodology that helps to make the insurmountable amount of information available on the internet easier to access. The globalization of knowledge management has become unwieldy and researchers often find it difficult to find the proper domains for their searches. Meenorngwar proposes a methodology for developing ontologies for emerging domains.

Montoneri discusses the analysis of teacher performance, and how that analysis can improve the learning environment. Within the teacher evaluations, his analysis focuses on four indicators, two input, and two output. Accordingly, the results give teachers suggestions for improving performance from communicating grades clearly to helping students' learning performances. Even though his study focused on English as a foreign language, this analysis could be applied to any subject, depending on the indicators selected.

While Montoneri focuses on teacher performance, Oya and Uchida look at student performance in a Computer Literacy course. They state that students' performance in the course improves if they work in pairs, as opposed to working individually. Their side note in the study is quite interesting in that their study revealed the most effective pairing of students were the pairs who exhibited, "… a small difference in basic academic ability, a large difference in PC experience, and a partner of the opposite sex".

Thomas et al. discuss curriculum development in Hong Kong universities, specifically, a capstone experience for students' final year project. They took a qualitative approach to

their study in order to gain insight from personal interviews and conversations from their student subjects. Through these insights, they discovered that the present capstone experience addressed closure of the university experience as well as reflection on their learning. However, it did not address integration of their learning and transition into the workforce. Thomas et al. discovered that curriculum design had a direct correlation to the effectiveness of a capstone experience.

Chew and Lee's article focuses on the specific course of Extensive Reading and how to make it interesting for students of the digital generation. They suggest that a gap exists for this generation between the texts they read outside the class and traditional texts used within the classroom. They propose using a reading blog to facilitate the traditional Extensive Reading methodology. Their study showed that their subjects unanimously agreed that the blog improved their motivation concerning reading. An interesting finding was that 86% of the participants enjoyed the social aspect of the blog. Oftentimes, sitting in front of a computer is not considered a social event. However, the students felt that reading a blog, and material that others posted, was more social than reading a text that the teacher had chosen. This finding begs the redefinition of a social event.

It has been a supreme pleasure in editing this journal. All articles were interesting and it was not an easy decision to narrow it down to those that were included. I applaud all the authors who submitted their work for inclusion and encourage them to keep researching and writing. To those who made the final cut, I thank them for their patience in working with us as this journal has taken much longer to publish than anticipated. The editors and

I have learned much, and look forward to publishing the next edition in a much quicker fashion.

*A final note on the type of English contained within this journal. Since the Asian Conference on Education brings together presenters with many world Englishes, a conscious effort has been made to keep the "English voice" of the author of each article intact. Therefore, when you read the articles, you may hear an Australian, British, or Malaysian English voice. This is in keeping with the spirit of global education. The digital voice must be global as well.

Are Standards-based Quality Systems a Threat to the Internationalization of Teaching and Learning?

Scott Thompson-Whiteside

Abstract

This paper explores the current shift in Australia's higher education system moving to a more explicit, standards-based quality system and its potential impact on international partnerships in teaching and learning, particularly in Asia. The new Tertiary Education Quality and Standards Agency and the underlying Higher Education Standards Framework have the potential to threaten a large number of transnational or cross-border programs delivered outside of Australia. With over one hundred and fifty thousand tertiary students studying Australian programs in Asia, the impact could be significant. It would also be significant for countries that leverage of Australian Universities to build human capacity within their country. The paper highlights the current practice of assuring equivalent and comparable academic standards in transnational education and explores how shifting to a more precise standards framework will require more explicit demonstration of standards across teaching, learning and student outcomes. If equivalent or comparable standards were to be achieved across the whole standards framework, it is likely to constrain the opportunities for internationalization and the formation of new transnational partnerships.

Keywords: tertiary education quality, standards framework, transnational

Introduction

Australia's higher education system is undergoing considerable change. Since publication of the *Review of Australian Higher Education* (Bradley et al., 2008), otherwise known as the Bradley Review, there has been increasing emphasis and debate on the notion of standards in higher education. The review stated that, "Australia must enhance its capacity to demonstrate outcomes and appropriate standards in higher education if it is to remain internationally competitive and implement a demand driven funding model" (p.128). The review also recommended a need for clarification and agreed measurements of standards and for institutions to demonstrate their processes for setting, monitoring and maintaining standards. In essence there was seen to be a need for institutions to explicitly demonstrate their standards for the sake of public accountability. As a consequence of the Bradley Review, the Tertiary Education Quality and Standards Agency (TEQSA) was legislated in March 2011 and established in July 2011 with responsibility for implementing a new Higher Education Standards Framework. This framework has five components and aims to specify more precisely the standards expected from institutions. Institutions are expected to demonstrate achievements against those expectations.

The more precise nature of the standards framework, in particular the teaching and learning component of the framework, will require institutions to demonstrate a whole range of teaching and learning standards. These standards will be assessed and judged in a number of ways, using both qualitative and quantitative indicators. The precise criteria for assessing teaching and learning standards has yet to be fully defined but TEQSA's decision to move away from institutional audits (Lane, 2011) suggests that

more emphasis will be placed on a range of quantitative data and benchmarked against institutional and national expectations.

The standards of teaching and the standards of students' learning will obviously focus on teachers and students in Australia. However, what has yet to be publically discussed is that it will also affect teachers and students who teach or study in Australian programs outside of Australia. These are students studying in Australian transnational programs. With nearly one hundred thousand students studying in Australian higher education in transnational programs (plus a further fifty thousand vocational education students), the need to demonstrate precise measures of teaching and learning standards may have considerable ramifications. If the current policy continues to mandate equivalent or comparable standards, a more precise, standards-based quality system may restrict the ability for Australian institutions to engage in transnational partnerships. It may also constrain the types of partnerships and the way in which curriculum, teaching and assessment is done.

This paper provides some background to the current regulation of transnational education and in particular the notion of equivalent and comparable standards. It will then address the new Higher Education Standards Framework and explore the implications for Australian transnational education.

Australian Transnational Education

The growth of transnational education, also known as cross-border education, since the 1990s has coincided with the growing demand for internationally recognised qualifications, the globalisation of professions and changing socio-economic

circumstances in Asia (McBurnie and Ziguras, 2007). Australia has been well positioned to tap into this growth. While many students choose to travel to Australia to study, many stay in their home country, or travel to a third country to enrol in an Australian program. Some of these students may be studying at an Australian offshore campus, and some may be enrolled at an institution that is in partnership with an Australian institution. In either case, transnational students are typically enrolled in an Australian program and upon successful completion will receive an award from the Australian institution. For the purposes of this paper I will use UNESCO's definition of transnational education as,

> …all types and modes of delivery of higher education study programs, or sets of courses of study, or educational services (including those of distance education) in which the learners are located in a country different from the one where the awarding institution is based. Such programs may belong to the education system of a State different from the State in which it operates, or may operate independently of any national education system (UNESCO, 2001, p.2).

In 2009 Australian Universities were offering 889 transnational programs delivered outside of Australia with the majority of programs based in Singapore, Malaysia, China, Hong Kong and Vietnam (Universities Australia, 2009). The nationality of students enrolled in those programs also followed the same pattern of countries (AEI, 2010). This means that the majority of students studying Australian transnational were based in their own country of nationality. Currently, Australian higher education enrolls over 100,000 students in transnational programs and is forecast to reach over

400,000 by 2025 (Bohm et al., 2002). With such a significant number of students, the regulation of quality and standards is critical.

The pursuit of transnational partnerships in the 1990s was largely for commercial reasons. Partnerships were established with little understanding of the risks involved and with little regulatory or legal framework (McBurnie and Ziguras, 2007). Currently, the risks and benefits of transnational education are more widely known and it is recognized that institutions need to be more strategic in their approach to developing new transnational partnerships (Connolly and Garton, 2007). Since the 1990s there has been significant development in the quality assurance of transnational programs and cross-border regulation. There are a range of national and international protocols, guidelines and codes of practice, but because they span different sovereignties, they are often voluntary.

The regulation of Transnational Education

Transnational education crosses social and cultural boundaries as well as the more obvious geographical and national boundaries of sovereignty. Students in Australian transnational programs are both national and international in relation to the host country of study, but few are Australian. Most of the academic staff teaching the programs are unlikely to be Australian. Students, institutions and staff are bound across, and sometimes between, different national regulatory frameworks, protocols and codes of practice. As a result, transnational education creates complex and dynamic tensions in the assurance and demonstration of quality and standards. These tensions vary between the host and awarding country depending on the mix of stakeholders and development of each regulatory system (Verbik and Jokivirta, 2005).

Different regulatory systems assert different levels of control over the assurance of standards in their home country or upon their home-based institutions.

Over time, there has been greater recognition of different regulatory systems and a drive towards the mutual recognition of national quality assurance and regulatory systems. In turn this has driven the development of common or similar regulatory systems. The internationalization of higher education, and with it the internationalization of quality assurance, has had an isomorphic effect on national quality regulatory systems (Van der Wende, 1999, McBurnie and Ziguras, 2007). Supranational agencies like the International Network of Quality Assurance Agencies in Higher Education (INQAAHE) and the European Network for Quality Assurance (ENQA) have emerged. While they are sharing best practice and developing quality assurance guidelines there is a sense that these supranational agencies are also driving a convergence of quality systems and a shared understanding of standards.

Nevertheless, these isomorphic effects also have the potential to create conflict. Regulatory systems are generally national in their scope and are designed to protect national interests. For transnational education, different stakeholders have different views. Some have even considered transnational education a threat to national standards. As Adam (2001) states,

> Significant numbers of institutions view transnational education as some sort of threat to standards and their existence. The scale and intensity of the threat is misjudged as it is currently confined to certain sectors of educational provision. However, its rapid expansion is likely to continue unabated and so will its impact. It needs to be subject to

> appropriate quality control mechanisms before the problems intensify. Governments and institutions in importing countries must consider why their students choose imported education. Fear of transnational education should not translate into ineffective protectionism (p.47).

The general response to the growth of transnational education in the 1990s was for host countries to increase the regulation of foreign providers or partnerships with foreign awards. However, strategies of tight regulatory protectionism had to be balanced with trade liberalization to ensure that the host country continued to attract high quality foreign institutions. This was a difficult balancing act and so it became apparent that the best way to protect and uphold standards was to have tighter regulation for institutions who award the qualifications (Harvey, 2004, Knight, 2005). In other words, the Australian regulation of standards took precedence over any regulation of a country in which it was being delivered. This does not negate the need for host country regulation but ultimately the awarding institution is more likely to pay attention to their home regulatory system.

Australian Protocols and transnational standards

In Australia, the development of a robust quality assurance and regulatory system has been acknowledged as a critical factor in its success of transnational education (AVCC, 2005a). Whilst the quality assurance of transnational education has largely been dealt with at an institutional level, the institutions are governed by a national regulatory system. Through the National Protocols of Higher Education Approval Processes, Codes of Practice, the Educational Services for Overseas Students (ESOS) Act, and the work of the Australian Universities Quality Agency (AUQA), Australia

has been able to develop a transnational quality framework that is considered best practice (Ilieva and Goh, 2010).

In particular, it is the National Protocols of Higher Education Approval Processes, which provided the initial settings for transnational education. Protocol section 4.2 stateed that if a program is delivered in an offshore campus operated by the Australian university, "standards should be equivalent" to those in Australia. Alternatively, if a program is delivered with a third party provider offshore, "standards should be comparable" to those delivered in Australia (DETYA, 2002).

The regulation of Australian transnational education reveals the complexity and ambiguity of standards in higher education. There is no explicit description within the Protocols as to what types of standard it is referring. Nor is there any explicit information about the definition or level of tolerance within the notion of equivalence or comparability. This ambiguity raises further questions about who sets, maintains, and assesses standards since it assumes that the standards in Australia are appropriate to be delivered in another country.

In April 2005, the Australian Vice Chancellors Committee (now known as Universities Australia) developed a Code of Practice for the provision of international students, which included guidelines for transnational education. The guidelines suggested use of comparability rather than equivalence, broadly following the UNESCO and OECD codes of practice developed in the same year. The AVCC code suggested that, "the quality of academic provision and academic support services offered under the arrangement are comparable" (AVCC, 2005b, p.5). Comparability

is tied directly to academic provision and academic support services.

At the same time as the publication of the AVCC Code of Practice, the Australian government published a discussion paper titled *A National Quality Strategy for Australian Transnational Education and Training* (DEST, 2005). Whilst the paper highlighted the success of Australian transnational programs, it also raised concerns over the transparency of Australian and institutional quality assurance, accountability and questioned the equivalence of courses/programs. In May 2005, the AVCC responded to the discussion paper, suggesting that the government failed to recognize existing quality assurance measures and requested clearer definitions of 'equivalent standards'.

> A key element of the discussion paper is that qualifications obtained offshore are equivalent to those delivered onshore in Australia. This idea of equivalence needs to be appropriately defined. Australian universities already address the need for equivalence between onshore and offshore courses through adherence to Protocol 4.2. The university interpretation of this protocol is that the equivalence is between programs offered by the same institution. The Department of Education, Science and Training needs to confirm that its interpretation of equivalence, for the purposes of this paper, is equivalence between programs offered by the same institution" (AVCC, 2005a, p.7).

In this instance, the AVCC was suggesting that equivalent standards were represented by the fact the programs/curriculum were equivalent and therefore complied to the same quality assurance mechanisms.

By November 2005 an agreed Transnational Quality Strategy was published which provided a framework for the planning and implementation of programs offshore (AEI, 2005). The Transnational Quality Strategy focused on three areas:

- Better communication and promotion of Australia's quality assurance systems.
- Improved data collection to inform future strategies.
- A strengthened quality framework that protects and promotes the quality of Australian transnational education.

The publication did not respond directly to AVCC's concern of defining equivalency but was more explicit on the issue. "Courses/programs delivered within Australia and transnationally should be equivalent in the standard of delivery and outcomes of the course, as determined under nationally recognized quality assurance arrangements" (p.1). Without any significant debate, the notion of equivalent standards shifted from *courses*/*programs* in May 2005, to the *delivery* and *outcomes* of the courses/programs by November 2005.

The broad policy statements that developed over 2005 gave significant room for interpretation and ambiguity. Between the National Protocols and the Transnational Quality Strategy there was no clear policy as to what types of standards needed to be equivalent or comparable and how they should be measured. There seemed to be no real understanding of where these different types of standards sit on a spectrum between equivalency and comparability. The confusion was highlighted in October 2006 in a government commissioned report summarizing a study of fifteen transnational programs in Australian institutions (IEAA, 2006). The report

highlighted poor understanding and definitions of terms such as 'equivalence', 'comparable', 'benchmarks', or 'standards' and recognized that terms are often used interchangeably. It went further to suggest that quality assurance in transnational education was a core concern for all stakeholders, and there was a lack of understanding of how the processes of quality assurance effectively worked with a diverse range of transnational programs and partnerships to ensure standards were maintained.

Equivalency and comparability of standards

Equivalency and comparability of standards are central components of the Australian regulatory system for transnational education, however, it is difficult to ascertain whether these concepts refer to programs, teaching, learning outcomes, student support and/or experiences. The national *Transnational Quality Strategy* suggests that delivery and outcomes should be equivalent or comparable depending on whether it is an Australian campus or a partnership (AEI, 2005). Not only is there a need for clarification on what the essential anchor points are for demonstrating standards, but also there is also a need for understanding the acceptable tolerance within equivalent and comparable standards.

Research on the interpretations of equivalence and comparability across a sample of eighty-five participants within Australian transnational partnerships revealed that these terms were used in a variety of ways. "Comparability was generally used to signify similarity (e.g. It is not of equal standard but is not far off) whereas equivalence was used to indicate equality or sameness (e.g. It is of same standard)" (Sanderson et al., 2010, p.3). The research suggested that the terms equivalency and

comparability were used in reference to standards, programs, assessment, student experiences and learning outcomes. The activities of assessment were used most frequently when questioned about standards in transnational education. Thus, the processes of assessment were considered the most valid and reliable reference points for assuring and demonstrating standards. This supports the view that assessment and the moderation of assessment in transnational education is the most effective way to demonstrate the standards of graduates (Thompson-Whiteside, 2011a). Moderation allows for informed judgments and a contextualization of standards.

Considering the variety of delivery models in transnational education, it is difficult to suggest that any standards could be equivalent considering that the students are different, the lecturers are different, the resources and learning environments are different, and the social and cultural surrounding are different. I suggest the wording of *equivalent standards* in transnational education is a misnomer.

Also implicit within the notion of equivalent standards is that one standard is higher or better than the other. Presumably in this instance, the National Protocols imply that the Australian standards are superior to offshore ones. The notion of equivalency and the assumption that Australian campuses are superior to their offshore ones fails to recognize the complexities of transnational education and ultimately is unproductive in generating mutually beneficial, long-term, sustainable partnerships. Since good partnerships are critical to the success of transnational education (Heffernan, 2005) the notion of comparability, rather than equivalence, provides a more appropriate framework of mutual respect and an appropriate level of flexibility. “The use of comparability recognises the extent of engagement of importing countries in the

transnational endeavor. This goes some way to constructing transnational education as a mutually productive and reciprocal engagement" (AEI, 2008, p.13). However, it is also acknowledged that comparability leaves open the potential for too much interpretation and needs to be constrained.

The use of comparable standards, rather than equivalent standards, also allows for contextualization of curriculum and teaching which is seen to positively meet the specific needs of a diverse group of learners and good teaching practice (Leask, 2007). The UNESCO/OECD Guidelines support the view that institutions are to "ensure that the programs they deliver across borders and in their home country are of comparable quality and that they also take into account the cultural and linguistic sensitivities of the receiving country" (UNESCO, 2005, p.15). It suggests that the contextualization of curriculum and teaching and learning practices are pedagogically and culturally appropriate. This, in turn, creates a range of tensions because if the curriculum or teaching is not equivalent or similar, is it possible to demonstrate equivalent or comparable standards? The presumption is that because the curriculum content is not the same, it is inferior. As Woodhouse and Carroll note, "Higher education is a construct in which the method of delivery, which is heavily influenced by its context, is inseparable from the quality of the outcome. Such a position brings into sharp relief the methods by which we seek to ensure 'equivalence' of student learning outcomes. These methods are still heavily influenced by notions of 'identicality' such as common curricula and centralized examination marking" (Woodhouse and Carroll, 2006, p.85).

These opposing views are also expressed by transnational students who have clear expectations that curriculum should be equivalent, yet contextualized to meet their needs. If for example, the content is too Australian-centric, transnational students have shown to be critical in student feedback (McLean, 2006). The result of this has been a universalizing of content.

> Removing location-specific content is often necessary to avoid confusing offshore students, but by trying to universalize a course, lecturers run the risk of abstracting curriculum from real-world contexts, and thereby elevate the status of 'universal' to many locally and culturally bound ways of thinking, communicating and working. The question we are faced with is why, despite the widespread agreement on the desirability of adapting and tailoring transnational programs to suit specific student groups, does it seem to happen so rarely (McBurnie and Ziguras, 2007, p.65).

Transnational students also want teaching standards to be equivalent to Australian standards, yet flexible to meet their needs (Leask, 2006). When the home regulatory system dominates, an institution is torn between meeting the demands of its transnational students, providing what is known to be good practice, and ensuring standards are near to equivalent by delivering exactly the same curriculum in the same way. The notion of contextualization suggests that standards are moving away from equivalency and therefore inferior. Navigating between notions of equivalency and comparability for different types of standards entails risks for the institutions that could potentially lead to a loss of reputation, loss of commercial return and closure of a program. For some institutions, the low-risk approach means simply having

equivalent standards across as many dimensions as feasibly possible. While equivalent standards in transnational education may reduce the potential risk for the awarding institution, it may not necessarily suit the needs of the host institution or its students.

Shifting interpretation of transnational standards

For the past eight years the Australian Universities Quality Agency (AUQA) has had the task of auditing transnational education and ensuring compliance with the National Protocols. The audits provided a public assurance of quality. The fact that transnational education has the potential for being 'high-risk', and that programs being delivered in another country provide significant signals about the quality of Australian education, the government felt that AUQA should scrutinize transnational activities more closely. In 2003 the Australian government allocated funding to audit transnational programs, which included visiting partnerships overseas as well as speaking to staff and students. Since 2003, AUQA has conducted between two and four transnational audits for every university that has programs offshore.

Greater levels of scrutiny in transnational education had had some effect on universities. It is no coincidence that since AUQA began auditing transnational education in 2003, the number of transnational programs dropped significantly. In 2003, Australian universities reported 1569 transnational programs. In 2007 this had dropped to 1002 and in 2009 to 889 programs (Universities Australia, 2009). Despite this, the number of students enrolled in these programs continued to rise between 2003 and 2009. This suggests that there was a consolidation and withdrawal of programs with low enrolments. Media reports suggested the withdrawal was largely

due to potential reputational risk and the lack of commercial return (Armitage, 2007). Of the programs that remained, AUQA auditors largely agreed that Australian transnational education was comparable with their home institutions (Woodhouse and Stella, 2008).

While there are considerable differences in opinion about the assurance of quality and the effectiveness of external auditing (Anderson, 2006), AUQA audits were useful in that programs and appropriate standards could be contextualized. The audits provided a forum to consider informed judgments and different interpretations of academic standards. The diverse social and cultural settings for transnational education make it important to contextualize standards.

Recent changes in Australia's regulatory system raises a number of questions of how transnational standards will be interpreted in the future. Since 2011, AUQA has been replaced with the Tertiary Education Quality and Standards Agency (TEQSA) and is developing a Higher Education Standards Framework. The Higher Education Standards Framework (DEEWR, 2011) has five components:

- Provider Registration Standards
- Information Standards
- Qualification Standards
- Teaching and Learning Standards
- Research Standards

Subsumed within Provider Registration Standards is a sixth element called Provider Category Standards. This section will also contain a revised set of National Protocols.

These will describe the principles that govern each type of higher education institution and provide a set of minimum standards. It is unclear at this stage whether the notion of equivalence for offshore campuses and comparability for third-party partnerships in transnational education will remain. Information standards deal with the collection and publication of data. A website called 'myuni' is planned for launch in 2012 and will contain a range of information relating to standards. Qualification standards largely revolve around a revised Australian Qualifications Framework describing the expected graduate outcomes at different levels of education. Underneath this may be the development of subject-level standards described as learning outcomes but this is yet to be confirmed. This would broadly follow the UK benchmark statements that provide external reference points for setting and assessing standards in institutions at the subject level. Teaching and learning standards is perhaps the most difficult and contentious area. The setting and assessment of teaching and learning standards is opaque and complex. It is not clear for example, whether standards will be set according to institutions' own missions and goals, against national or international standards (Thompson-Whiteside, 2011b). Lastly there are research standards, which are likely to be assessed through the Excellence in Research Australia (ERA) initiative, which collects research data to assess research performance within institutions.

While many of these standards are under development it is clear that by withdrawing from an auditing process TEQSA will be relying much more on quantitative data and performance indicators. A range of these potential indicators can be seen from Table 1.0 extracted from Coates (2010). The integrity and reliability of this data becomes

paramount. As Coates argues, "it is vital that indicators are valid, relevant to key phenomena, stable across contexts, transparent, non-trivial, responsive to change, auditable, efficient to collect, preferably readily available, as simple as possible, quantifiable and generalisable" (p.6).

Table 1.0 Indicators of education quality extracted from (Coates, 2010).

	Outcomes	**Processes**	**Inputs**
Higher Education Learners	• Graduation rates • Graduate destinations • Learning outcomes • Graduate capabilities • Work readiness • Satisfaction	• Student engagement • Retention and Progress	• Entry levels • Entry pathways • Student diversity • Student characteristics • Student aspirations
Higher education Teachers	• Teaching experience • Teaching resources	• Teaching processes • Course management • Support systems	• Staff characteristics • University enculturation • Educational resources • Curriculum
Higher education institutions	• Institutional growth • Institutional reputation • Community engagement	• Academic governance • Academic management • Academic culture • Staff development • Quality systems	• Institutional characteristics • Institutional resources • Industry engagement • Graduate capabilities • Work readiness • Satisfaction

The problem in using a range of these indicators for transnational education is the highly contextualized nature of teaching and learning. The reliance of quantitative indicators in transnational education raises potential problems for transnational education for a number of reasons.

First, the collection of data in transnational education is poor (Garrett and Verbik, 2004, Verbik and Jokivirta, 2005). The fact that students are based offshore from Australia means that the Australian government relies heavily on individual institutions collecting the data. In some cases institutions will collect enrolment data centrally but quite often the collection of data is done in individual departments. While Australian institutions typically report enrolment data to the government there is a lack of data concerning teaching and learning. Until now the public assurance of quality was done through an auditing process and largely focused on institutional processes. As a result the quality assurance of transnational education has largely been framed around institutional processes of teaching, assessment and the moderation of assessment. Most of these processes do not necessarily involve the collection of data. As a result there is little comparative data analysis between offshore students and onshore students.

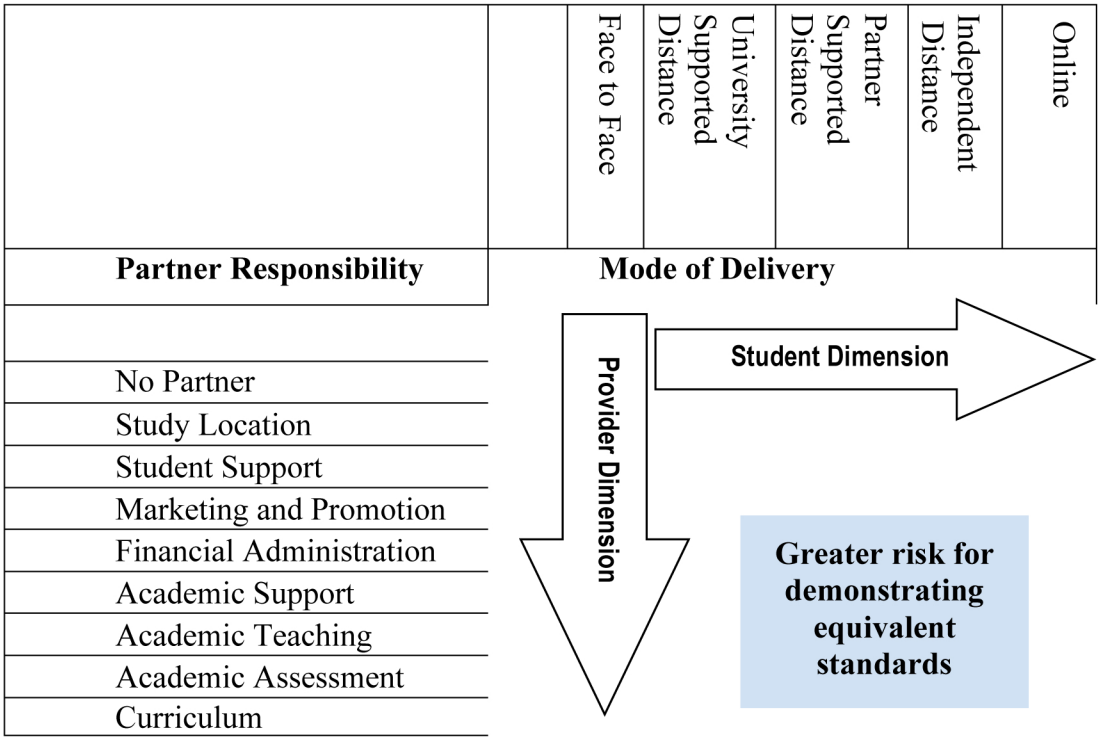
Second, one could argue that even if the data were to be collected, it would be invalid to compare offshore students with onshore students. Comparing data across culturally and socially diverse settings, across different locations is bound to be complex. Some indicators are likely to be equivalent but others are likely to be different and these differences can have multiplying affects. The processes of teaching and learning are dynamic, complex processes and not easily measurable as discrete activities. Even if some standards were stable or equivalent, it does not necessarily mean that all the

other standards would be equivalent. For example, if entry standards and curriculum were equivalent, it does not necessarily mean that teaching, learning or graduate standards are equivalent. Comparisons of teaching and learning standards using purely quantitative data have the potential to be misinterpreted.

Third, the emphasis on quantitative data has the potential to create a situation of absolutes. If data between onshore and offshore students are compared and not equivalent then one is presumed to be inferior. There is no contextualization of the data. Of course, if the policy settings (e.g. the Provider Registration Standards and the National Protocols) allow for comparable standards then the question is what difference is acceptable? How does one interpret the differences that inevitably will occur in the data?

The shift towards a more precise, quantifiable assessment of standards has potential ramifications for transnational education that has to be fully understood. Where audits allowed for a contextualization of standards, a standards-based architecture that is more 'light-touch' and data driven has the potential to highlight differences that exist for very good reasons. If equivalent data between onshore and offshore shows equivalent standards, then logically, data that shows significant differences suggests notions of one having inferior standards to the other. Ensuring equivalent data between onshore and offshore is likely to be more difficult depending on the mode of delivery, the level of autonomy and the amount of contextualization that takes place in the classroom. By examining the Two Dimensional Typology in Figure 1.0 developed from Davis, Olsen and Böhm (2000), it is likely that a data-driven standards framework will become more risky for transnational education in the bottom right quadrant.

Figure 1.0 Two dimensional model of transnational education extracted from (Davis et al., 2000).



The result is likely to drive institutions away from certain international partnerships, and certain types of transnational delivery models. Australian institutions are likely to want greater control and certainty over their teaching and learning standards. Where transnational programs have high levels of involvement from third party providers, in the form of teaching, the contextualisation of curriculum, and/or assessment, the risks of demonstrating equivalency in a data-driven standards framework, are likely to be greater.

Conclusion

The recent shift in Australia away from quality assurance and auditing of institutions, to a more precise standards-based framework has considerable implications for Australian transnational education. A standards framework that relies heavily on the comparison of data has implications to drive institutional behaviour away from certain forms of international collaborations and types of transnational delivery. The comparison of data does not sufficiently allow for interpretations and a contextualisation of complex teaching and learning processes in different cultural settings. When policies require equivalent standards in transnational education, then the risks for transnational may be too high. Even if policy settings allow for comparable standards, any differences in data will be considered a risk to standards. The notion of difference and the desire to reach equivalency fails to recognize the complexities of transnational education and ultimately is unproductive in generating mutually beneficial, long-term, sustainable partnerships. To minimise any potential differences, Australian institutions are likely to constrain the types of international partnerships, the types of transnational delivery and reduce the number of programs. This in turn will have implications for countries that use transnational education as a way of capacity building. It is likely to restrict access to Australian higher education for students in those countries.

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A Methodology to Develop Ontologies for Emerging Domains

Chai Meenorngwar

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Abstract

The characteristic of complex, dynamic domains, such as an emerging domain, is that the information necessary to describe them is not fully established. Standards are not yet established for these domains, and hence they are difficult to describe and present, and methods are needed that will reflect the changes that will occur as the domains develop and mature. This research proposes the Liverpool Metadata or LiMe methodology to develop an ontology and organise the knowledge that is necessary for developing the domain environment descriptions. Its aim is to capture Knowledge Information (KI) from research articles and translate this into semantic information with web description languages such as XML(s), RDF(s), and OWL. LiMe represents an Ontological Framework, which provides the concept characteristics, represented as a concept framework that specifies conceptualisations of the knowledge. LiMe supports the Semantic Web development. "e-Learning" has been chosen as an example of an emerging domain in this research. The characteristics of e-Learning concepts will be extracted from research articles of journal websites such ScienceDirect, Springer, etc and represented as knowledge. LiMe also explicitly represents how these concepts are developed and evolve to represent the domain.

Keywords: E-learning domain; emerging domain; knowledge information; ontology; semantic Web

Introduction

Overview

The range and quantity of information available via the Internet today has created well-known problems of information overload, including difficulty of access and problems of selecting information that is appropriate and reliable. To address these problems, ways were required to categorise and organise information for access by users. The idea of using multiple sources can facilitate the reliability of knowledge, but increases the need for effective knowledge management.

A domain of knowledge can typically be seen from different perspectives. Also, information about them is diverse and possibly contradictory. Think for example of the huge mass of information contributed every day on the Internet. Therefore, methods are needed to classify and identify information to find reliable sources to construct the knowledge.

In addition, information can change and be flexible, based on time and need. For example, complex domains such as software development have a lot of platforms and standards. Knowledge or concepts in the domain have been defined or represented in different ways. Therefore, users find it difficult to choose the suitable system or concepts for their own environmental needs.

This shapes a complex and unstructured environment where unstable concepts and information are contributed all the time in a domain. The representation itself of the domain is also difficult. It needs methods to capture new concepts, organise existing concepts, and translate into well-formed information that could be shared and reused.

Objectives

The work in this research sits broadly in the field of Knowledge Management (KM). KM (Eriksson, H., 2004) is identified as the capabilities and communication that include: (1) converting individual to group-available knowledge; (2) converting data to knowledge; (3) converting text to knowledge; (4) connecting people to knowledge; (5) connecting knowledge to knowledge; (6) connecting people to people; and (7) connecting knowledge to people. It is represented as the combination of documents and ontology that can help organisations describe, store, catalogue, and retrieve information in a systematic manner.

This research introduces an approach that can help the users to classify their information and to represent it with a well-formed structure. The approach provides an ontological framework to structure one individual existing domain. This work focuses in particular on the problem of information management in an organisation. Information within an organisation needs to be accessed for different purposes. Experiences from individuals in the organisation help forming the common understanding, which could used or reused to develop new information, therefore it needs to be made shareable and reusable. In fact, individual experiences are a very important source of knowledge. For examples, researchers use the educational experiences to find the information about their experiences, governors used the working experiences to organise their daily information, and teachers collected the information from books, experiments, and so on to prepare their courses.

The aim of the research described in this research is to investigate issues involved in the representation and management of knowledge arising in an emerging domain. A number of techniques have been used for representing domain knowledge. In most cases, these methods assume the existence of a well-defined body of knowledge that can be assumed to be reliable and definitive, and needs only to be organised appropriately. In the case of emerging domains of knowledge, however, these assumptions are not valid. In this case, the "body of knowledge" is incomplete and constantly changing, and may include significant errors, inconsistencies, and instances of different assumptions, conclusions and terminology. Only when the domain reaches a state of relative maturity can these issues be resolved definitively. Meanwhile, however, there remains a need for researchers and practitioners to make use of the knowledge while it is in this state of evolution.

This research proposes a framework, Liverpool Metadata (LiMe), as the way to transform the individual experiences into relevant information for a particular domain by applying an ontology approach, structuring these experiences in terms of concepts and the relation between concepts. Concepts are defined from different perspectives under the same domain. These could be redefined, reused and described as specification of the particular domain. The development processes of the LiMe methodology is described in the following section. LiMe provides techniques to measure the relation between the concepts in the ontological framework. This allows to store and access with the other. The relation between the concepts presents as knowledge to improve the framework from new information. It is described with the well-defined descriptions such the formal language such XML(s) and RDF(s).

An ontology is a shared description of concepts and relationships in domain knowledge. It consists of terms, their definitions, axioms relating to them, and a taxonomy organizing them. The main objective of an ontology is to enable communication and knowledge sharing by capturing a shared understanding of terms that can be used by humans and programs. It has been argued for the use of knowledge representation techniques capable of reflecting the situated nature of human cognition (Gahegan, W.P.a.M., 2007). It also facilitates the sharing and reuse of information and can reduce the analysis, design, and development time of complex systems.

Within the body of knowledge to represent, a distinction can be made between information coming from referential sources and information coming from practical sources.

Referential sources use documents such as a research paper which provides reliability to the domain. Practical sources use the working experiences such tasks, activities, etc. In case study section, the approach will be exemplified by means of two case studies, one in the educational field (e-learning case study) and one in the governance field (e-inspection case study).

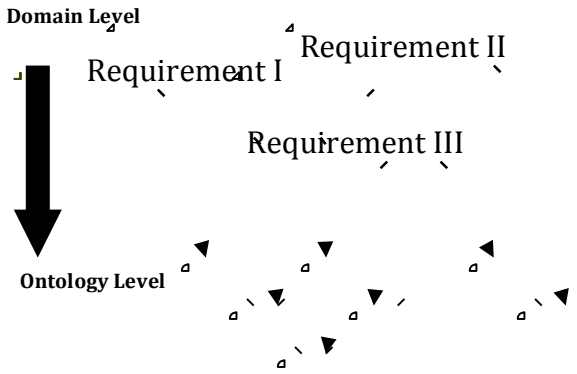

Figure 1: This description of LiMe approach.

For both the above cases, information was developed with the cyclical processes. Firstly, new concepts were defined from individual experiences and formed the structure of knowledge. This was represented as a tree of concepts. Secondly, each concept was linked with the other concepts forming relationships. Users are helped define and arrange these concepts by the LiMe environment. LiMe introduces similarity of concepts in the ontological framework and provides the user with directions for descriptions: generalisation and specification. Therefore, the users can define the appropriate descriptions for each individual information environment.

Figure 1 illustrates the main spirit of LiMe approach: users characterise their own requirements on the domain and are helped to represent them in an ontology. Organisations typically have to deal with lots of information which is unstructured and difficult to reuse and share.

Case Studies Outline

In this study, two different organisations, educational and government environment will be used to show how an ontological approach can help classify information in complex scenarios.

The e-Learning case study demonstrates the use of referential sources to capture online learning concepts from research papers to shape the domain knowledge for the Valaya Alongkon Rajabhat University. E-learning is a good example of an "emerging domain", that is a domain which has the particular additional difficulty that the current body of knowledge is not stable (O'Hara, C.B.a.K., 2007). Research into e-Learning is currently very active (M del Puerto P., 2008), and the concepts involved are constantly also being redefined and introduced in different ways. In the case study described in this research, human researchers deal with an emerging domain by a process of continuous review of published literature, from which the current consensus emerges. In the same way, published research papers will be used as the input resources of this research.

The second case study will demonstrate the use of practical sources to represent the information that is used for describing the problems in the project inspections task for the Royal Thai Government. It will later describe these case studies in detail.

Research problem

In the Internet era, people are using the information from the websites or place that they connect to. Technology provides a convenient living style. However, there are some problems for information developers in case of complex and ever changing, emerging domains, such as in the government sector or e-learning. The increasing amount of information, especially internal information such documents, projects, tasks, requests, etc, contributes to the unstructured nature of information.

The obstacle of accessing the appropriated information needs much more time and high development costs. This research will provide processes of information classification by using an ontology approach. This is the beginning of this research problem. The research question and problem is described below:

- Research question: Is it possible to organise the information of an emerging domain by using an ontology approach?
- Hypothesis I: The experiences or information from the different people could be represented with the ontology. These come from the individual person of the organisation.
- Hypothesis II: Information from an emerging domain could be used and shared the information by using the existing ontological framework.
- Hypothesis III: Semantic Web could be developed from the existing ontological framework as input.

In this research, an attempt will be made to define ontologies to facilitate environment description and represent a complex, frequently changing domain. A tool, LiMe has been implemented to capture the relevant information from a particular domain. The

objective is to transfer information and data from paper or oral communication to a representation of the knowledge in a computer system.

Literature review

In this research, an ontology development approach is proposed for capturing information and knowledge in complex domains, such as an emerging domain or a domain involving flexible information, various approaches and methods that change constantly. E-Learning systems will be used to illustrate a domain of the former kind, while a government setting will be used to illustrate a domain of the latter. In the implementation of the research, languages such as XML(s), RDF(s), and OWL are used to describe the domain environment. This chapter reviews the literatures to support the research approach. The section has the following four main sections:

- Knowledge: problems such as using knowledge in various platforms, describing knowledge with different approaches, time to develop knowledge in the organisation, etc. Knowledge development is introduced to facilitate and solve these kinds of problem.
- Ontology: ontology technology could be used to organise the knowledge.
- An e-Learning system: the e-Learning systems has introduced as domain example.
- Semantic Web: it has been used to represent the flexible knowledge information in the domain.

Knowledge and Information

Knowledge characteristic has been classified as degree of articulation and aggregation (Cooper, 2007). It is information in the context of other information, such as the relationship between data, information, knowledge and wisdom represented in it.

Knowledge is different from information when it has been used or introduced as problem solutions. The knowledge definitions are concerning on the goal of the problem. For example, the knowledge (in term of learning/teaching of online environment) is the information about the courses in the pedagogical curriculum. Knowledge is the information which solved the particular problem.

Information is derived from raw data in the events. For example, the registration data such as student information, courses registration details, are contributed when the students choose the online courses. Information could be constructed from these data such as registration table, numbers of the courses that open for selecting, instructor/teachers/allocating to the courses.

Knowledge has been defined as classification, without the classification human could be thought, action, or organisation such example of Dewey Decimal Classification (DDC) which is a method that uses in US Library of Congress classification (Wingyan, 2007). Knowledge is unstructured information provided by different sources such research papers or working experiences. The next section will present some techniques to manage knowledge.

Ontology

This research is concerned with building an ontological e-Learning requirements framework to facilitate the users or the developer to understand and use it for referencing, describing, searching, retrieving their own environment from the academic research methods or article as knowledge resources. An ontology specifies a common conceptualisation, independent of data model, and this may be presented as Semantic Web. It extracts data user contributions, and captures data as people share their knowledge in terms of classes and relations between classes. It represents existing things by illustrating and structuring the knowledge from important vocabularies. Basically, people adopt their vocabularies to the ontologies. Then, description languages such XML(s), RDF(s), OWL have been introduced to encode the structured data and tie it with common vocabularies as classes, properties, and relations with well-maintenance namespaces.

The domain will be represented as a common framework and helps to integrate or exchange data from multiple resources. The consistent knowledge of a specific domain environment is captured and combined with different information sources. Then, a reasoning approach is needed to support to interpret this framework as semantic knowledge.

In ontology, the characteristics of an interest domain have been described as concepts or entities, properties of the concepts, and relations between concepts that include the constraints (Patil, 2005). Thus, it will be used as value-mapping (support the various format or data), and scalability (depending on the context of data) (N.Huhns, K.M.a.M., 1997).

An ontology is a specification of a concept or property as knowledge (Sheng, 2004) or a concept framework (Zhang, 2006) and content management that consists of five primitives (Wang, 2006): class, relation, function, axiom, and instance. It specifies a conceptualisation of a domain in a term of concepts, attributes, relations, instances, and theories. A concept is a set of individuals or objects in a domain. An attribute is used to depict an intrinsic feature of objects. In addition, the domain scopes or objectives of the domain will be described with concepts and relations. Semantic translation determines the similarity between terms as instances of different domains and maps instances from one to other.

In practical terms, Semantic Web technology uses Ontology abilities to communicate between human and computer by providing an explicit specification for the conceptualisation of the existing domain. The classic Web will be extended with the meaning of concepts on Semantic Web which could also be shared and reused.

Next, it will explain examples of the research areas that used ontologies to describe their domain environment.

In Information Retrieval systems (Hwang, M.K., 2007), ontology is used to create, query, inference, and management information that help users to edit, delete, and modify the existing knowledge in the domain. In order to retrieve the information from the ontology, the reasoning and processing will be used in the query engine.

For example in the tourism domain (Dai, B.A.W., 2005), it is not only information such as the accommodation profiles (details, facilities, etc) that is annotated with RDF

metadata which could be retrieved but also tourism information such as water quality, places, etc could be annotated as semantic data and used for intelligent search (Sebastian Hübner, R.S., 2004).

Wingyan (2007) proposed Web directories to use ontologies to organise voluminous information into hierarchical structures, and help users to quickly locate relevant information and to support decision-making.

E-Learning

An e-Learning system is an education system that is provided in an online environment, usually via the Internet. Various related terms include virtual classroom, online learning, web-based learning, computer based learning, web instructions, etc.

The use of the Internet in education has the potential to motivate students and teachers, increase student participation and interaction in the classroom, and provide students with a more active role in their learning and increased autonomy in the educational process. While teachers are requested to use the capability of the new high technology to facilitate learning processes, students are encouraged to improve their learning through computer and networked-based activities.

For example, the Ubiquitous e-Learning (Norm Friesen, R.M., 2005) is a formal education which not only outside the classroom but also outside the education environment such as workplace, street, home.

In addition, an e-learning environment (Norm Friesen, 2005) regards teaching as a continuous process transferring knowledge with delivery in different forms such as offline and online learning; self paced and live learning; structural and unstructured learning; formal and informal learning.

With LiMe, a learning environment to be developed as e-Learning will be designed and organised, and the environment based on individual requirements. These requirements will be transformed as a common understanding framework which available to be modified by each user. The different facilities such human or knowledge experiences, technologies, learning materials, etc could be solved by using this common understanding framework.

Semantic Web

Semantic Web has been used to produce a semantic context-aware knowledge management framework that enables to integrate knowledge discovery, retrieval, and reuse (Norm Friesen, 2003).

Semantic Web technologies use smart tools to assist the system administrators to manage and control various kinds of problem. The requirements of the domain environments could be represented without misunderstanding by extracting and modelling the knowledge from the various documents and using Ontology to access and manage knowledge. Consequently, the common understanding of concepts is presented as semantic knowledge.

One of the most important aspects of the Semantic Web is searching knowledge from ontologies. Rules of representation have been designed in machine understandable

form (Nenad, 2002) facilitates to achieve the semantic information. However, it needs mechanisms and background knowledge about the domain for processing on ontologies such as updating or adopting their knowledge and reasoning strategies.

Liverpool Metadata

This chapter will illustrate the methodology to build and share ontologies for representing an Emerging Domain such as the e-Learning requirements domain, and will introduce 'LiMe' (Liverpool Metadata), as a means to facilitate the description of the Knowledge Information.

The idea of LiMe is to provide the descriptors or concepts which represented knowledge that obtained from research papers. In an emerging domain, the research papers provide the only effective knowledge resources, and using an ontology enables to describe this as knowledge information from them.

LiMe presents the knowledge specification of domain environment and provides the ability to share and reuse knowledge, providing a common understanding among different perspectives. People often give different names or definitions for the same thing, or different things can be described with the same definitions. An ontology aims to help this kind of problem.

Aim

The characteristic of an Emerging Domain (ED) is that the information necessary to describe it is not fully established, and hence it is difficult to describe and present, and needs methods that will reflect the changes which will occur as the domain develops and matures.

Knowledge/Information Ontologies provide the knowledge or descriptions that are necessary for developing the domain environment descriptions. The aim is to capture knowledge information from the research papers and convert to Web Description Language such as XML(s), RDF(s), and OWL.

It represents Knowledge/Information as Ontological framework, in which Concept Ontologies provide the concept characteristics which are represented as a concept framework that specifies conceptualisations of the knowledge. Representation Ontologies use the Semantic Web to illustrate the domain environment based on an ontological framework.

Characteristics

Methodologies used to develop an ontology have five different techniques: frames and first order logic, description logic, software engineering, and databases (Gomez-Perez, 2004).

LiMe uses the database technique and presents the domain with hierarchy of concepts as tree in the figure 2. It has been designed to store knowledge from information or paragraphs of the research articles. Both information and paragraphs are called

Knowledge/Information (KI) which is a consensual knowledge used to extract the concepts and their properties as Object Oriented modelling.

Environment will be organised and represent the characteristic of the domain. The particular environment is the subsystem or sub-organisation that represents the functions in the domain. For example, in e-Learning domain, it consists of learning, teaching, and management.

Knowledge/Information in the particular environment is used as referencing resources that defined concept, properties, and instances. This information also facilitates to define the relation between concepts. Relation is the relationship between two or more concepts. LiMe classifies the relation in two different relation categories: specification and generalisation. It also presents the semantic meaning direction. Specification is the top-down approach and generalisation is the bottom-up approach. Both approaches are used to develop trees or taxonomies that are called ontologies in the domain. A circumstance of domain uses ontologies to exchange the common understanding and give as a structure framework.

LiMe methodology organises domains as a five-level taxonomy. For example:

- Domain: e-Learning
- Environment: Learning, Teaching, Administration, Infrastructure, etc.
- Knowledge/Information: definitions or meaning, functions, Examples, etc.
- Metadata: Learning Material, Student, Teacher, Learner, Instructor, etc.
- Properties: Learning process, tasks, etc.

LiMe Resources

LiMe illustrates a hierarchy of research papers as Web resources and Knowledge for developing the Ontology of a particular domain environment. A research paper is organised with two parts: Reference Resource and Knowledge. It is introduced as Web Resources which contain reference information and knowledge. Knowledge will be classified as Information that is captured from the research paper or the individual experience which is contributed by the developers.

A research paper contributes information such as research problems, research methods, objectives, research results, and conclusion, represented using text, tables, or diagrams. This information is used as Knowledge /Information (KI) for developing an ontology. LiMe captures KI from the research papers using the individual experience and background knowledge of the (human) reader. Moreover, LiMe uses KI to extract or define the concepts that are related to the domain. A concept may be a general concept or class, a specific concept or property/instance, or a relation concept that represent the relationship between concepts, instances, or properties.

Instead of searching the knowledge based on keywords from the journal, LiMe organises knowledge that facilitates to reduce the retrieval time. The unnecessary article will not be listed. However, the appropriate concepts that facilitate to identify or describe the knowledge are important, costly, and time consuming process.

LiMe's Development Cycle

To capture the Emerging Domain (ED), flexible or new concepts are extracted from the research domain. LiMe presents these concepts knowledge as Metadata and uses

to develop ontology. LiMe proposes the development cycle (Figure 2) with four basic methods: KI identification, Concepts extraction, Ontology development, and Requirements representation.

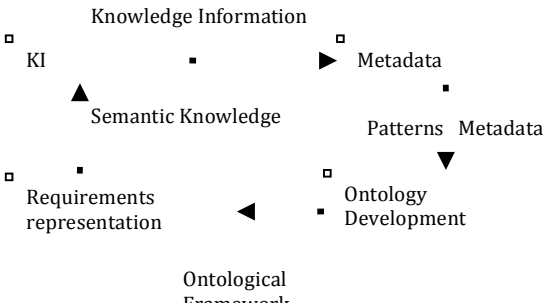

Figure 2: This figure illustrates LiMe development cycle.

The information relating to the ED is gathered from research papers. Our aim focuses on transforming the Domain specification to Semantic Knowledge.

Domain specification > Semantic Knowledge

In LiMe, domain specifications will be represented as the requirements from various researchers that contributed KI included both approaches and results in this research domain area. This knowledge will be organised with concepts that extracted from this knowledge information. Concepts also represent the patterns of knowledge which is used to classify the knowledge categories such as meanings, definitions, specifications, functions, tasks, etc.

An ontology in our research is the knowledge classification. It describes the domain specification. It translates the KI in each particular environment to ontological framework. This framework is the place for interchanging the knowledge in the environment and will be interpreted as semantic knowledge with Semantic Web.

Knowledge identification

In order to extract the knowledge from the research paper, LiMe imports the Knowledge/Information by using the academic journal search engine which the keywords to gather the domain specification from search engines of the academic journal websites such as Springer, ScienceDirect, IEEE Xplorer, etc. However, this phase does not an automated mechanism, human still have to choose and find the related papers. This process could take a lot of time especially for non-expert knowledge domain developer within huge related domain articles are listing.

LiMe describes KI as the crucial information or context information that help the users (developers, researchers, etc) to understand about the domain where could locate on paragraphs of paper articles such abstracts terms, definitions, notation, abbreviations, examples, approach, results, experiences, discussion, related topics, and so on.

In addition, LiMe also introduces the patterns of knowledge such as meaningful/definitions (descriptions), components (properties, instances), restrictions (relations, condition, constraints), etc. which could be added and improved. LiMe will store these patterns as KI categories and use them to reduce the time of capturing in the future. In order to understand, the tasks of Knowledge identification have been represented as follows:

1. Define the scope or particular environment of domain of interest, which is the objective for developing an ontology. For example, this research concerns on describing the e-Learning requirements domain, therefore, the objective is to

develop an ontology to annotate requirement in e-Learning domain, to help e-Learning researchers or organisation developers.

2. Define the keywords that related to the domain or scope, such as topics, title, instances, etc. Instead of only generate keywords from background experiences consideration, keywords could be found in the LiMe's thesaurus within the existing environment framework.
3. Use the keywords to find the related articles from the academic journal websites. With the large number of online papers, existing keyword-based searches retrieve many irrelevant papers that may use a certain word in different contexts; they might also miss papers when different words about the desired content are used.
4. Find the crucial information related to the domain, based on the previous patterns or categories. A pattern is a kind of context that identifies the relation to the scope, environment, or domain which is not easy to identify. Especially, different researchers express their knowledge in different ways. Background experiences of the domain will help to identify the knowledge context from the general information.
5. Capture the KI from articles and store it to the LiMe system. This KI will also translate to the formal language XML(s). LiMe also captures the article profiles such as title, author(s), journal, volume, issue, page, and URL. This information is a reference resource to refer during developing an ontology. Note that LiMe does not upload the file resource.
6. Update and improve the pattern identification. All the tasks are repetitive tasks. LiMe enables the developer to define the patterns which are the contextual criteria of KI.

Metadata extraction

LiMe produces sets of Metadata of the domain environment which are extracted from KI obtained from the research domain articles. LiMe presents Metadata in the term of "concept". In order to extract the concept from the KI, the follow steps are followed:

1. Find the general or specific topic such as subject or object in the statement. LiMe is concerned with capturing the definitions, components, or functions from the KI. There are various ways to find the concept in the paragraphs: find the specific concept, find the general or abstract concept, and use experiences to define the concept.
2. Given the type of concept, LiMe has four different concept types: class, properties, relations, and instances. Class is the entity or the existing things of the environment in the domain. Properties are the specification details of the concept. Relations are the relationship between concepts, which are properties of a concept. Instances are the example objects for concepts. Some concepts could be both class and properties. LiMe presents concepts as the Object Oriented model in Class, attributes and objects.
3. Define an explicit relation hierarchy between the concepts in the same KI. In addition, properties, and instances are used to specify characteristic of concept. LiMe uses taxonomies to organise concepts, properties, relations, and instances in the ontology. LiMe has relation based on type of the concepts.
4. Compare this topic with LiMe's thesauri that provide semantic between concepts such as synonym relationships. Then, update the new concept to the thesauri. A concept might take different assumptions from different perspectives and be used in different areas. In order to clarify the definition, LiMe proposes the existing

concepts with an ontological framework that could be specified the definition for creating the new concept in the thesauri.

5. Generate tree or taxonomy of the concepts to represent knowledge and also translate this taxonomy to formal description language such as XML(s), and RDF(s). Therefore knowledge is represented with one or more taxonomies from a particular KI as independent descriptions.

At this step, LiMe produces Metadata that will be used to describe the knowledge from KI. LiMe has classified Metadata based on the three basis functional types described from the statements in KI. Descriptive Metadata is a concept that describes the information such as meaning, definitions, etc of the knowledge. Structural Metadata is a concept that classifies or structures information of the knowledge. Finally, Administrative Metadata is a concept that describes information such as constraints, conditions, rules, etc of the knowledge. A set of concepts extracted from KI will be represented in this task.

Ontology development

LiMe proposes to develop an ontology for representing the Emerging domain. The development process is mainly integrating the taxonomies constructed from KI of research articles. An Ontological Framework (OF) is the result of this method. It enables developers to communicate and interact to the Emerging Domain by contributing the common understanding of concepts. This is a structure information that objective, accessible reusability, and flexible accomplishment.

In order to develop an ontology, LiMe proposes two basic processes: Similarity measurement, and Taxonomies integration as following.

Similarity measurement

LiMe uses the similarity between two concepts to reduce the redundancy and presents consistent concepts. Similarity could be easily detected by humans, whereas computers need to evaluate parameters to identify the similarity.

Currently, there are some methods that contribute to similarity algorithms such as Information-based similarity (Al-Mubaid, 2006), functional and textual based method (Ganjisaffar, 2006), and similarity graph (Andreasen, 2003). And, the relationships between concepts could be described in the terms of Synonymies, Hyponymies, and Overlapping (Maria Ruiz-Casado, 2005). Synonymies denote that two or more concepts have the same meaning. Hyponymies denote that a concept has more than one meaning. Overlapping indicate that concepts are neither synonymies nor one hyponymy of each other, but represent to some extent the same reality.

LiMe proposes to use the combinations of two techniques to compute the similarity between concepts: first, using the weight of the concepts, and secondly, using the distance between concepts.

Weight-based technique. This similarity method described in (Ganjisaffar, 2006) is based on functional and textual information. The concept similarity function calculates, from a pair of concepts, a real number between 0 and 1, expressing the degree of similarity between two concepts, based on two characteristics: Taxonomy

based concepts and weight Information Content. The "1" value indicates that a pair of concepts are strongly similar whereas "0" indicates that they are different.

Edge-based technique. This similarity technique counts the edges between concept c1, and c2. For example, (Zhumin, 2006) describes Wu and Palmer algorithm that calculated the similarity between concepts as following.

Sim(c1,c2) = 2 x / (x + 2 x)

Where and are the length of the path from c1 and c2 to their most specific common super-concept c3, and is the length of the path from c3 to the root of the hierarchy.

Taxonomy integration. In order to integrate taxonomies from a domain, LiMe focus on a similarity measurement. The relation between common concepts will be defined with "is-A" and "part-Of" relationships. The "is-A" relation is used to express that a pair of concepts have fully similar characteristics. The "part-Of" relation is used to express that there are partly similar characteristics between two concepts.

LiMe uses both a Top-down and a Bottom-up approach to integrate and express the knowledge direction in taxonomies. Top-down approach is used to annotate a more abstract concept with the specific existing concepts. This could be extracted not only from the research papers but also provided by domain experts as their background experiences.

To optimise taxonomies, LiMe uses Term matching technique patterns (Asanee, 2004) that integrate the similarities concepts to structure, form, or extend the taxonomies with four different cases.

A term matching technique is used to integrate a taxonomy which has a concept that could be expressed with relations to a different taxonomy. In additional, a consistency concept is the similarity between concepts in different taxonomies and could be expressed with the"is-a" or "part-of" relation. LiMe calls an existing taxonomy that is extended with a consistency concept as a core hierarchy.

Requirements representation. LiMe is concerned with representing Knowledge that is constructed from individual user perspectives. LiMe defines knowledge provided from the individual research article as requirements.

In order to provide a dynamic or flexible representation, a distinction can be made of the source contributing knowledge in two basic types: the reference requirements and the user-defined requirements. This will allow the users or developers to have a flexible opportunity to define their knowledge as knowledge template.

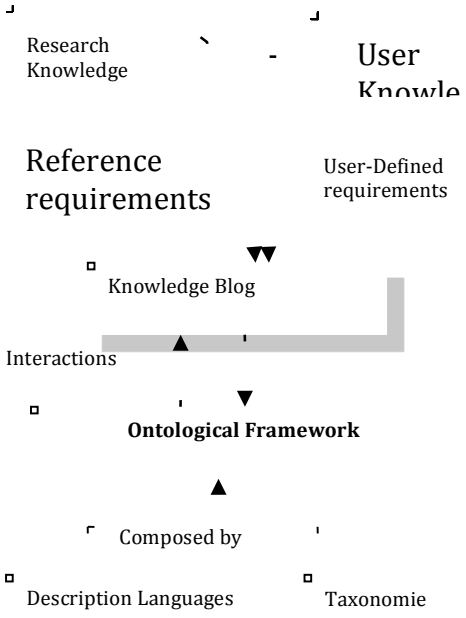

Figure 3: Knowledge Blog in LiMe.

The reference requirements are perspectives on the knowledge, the information from the research paper or articles. The user-defined requirements are contributed by the users or developer in the organisation and will be used to understand the background knowledge about the domain. It is possible that they do not have the knowledge or understanding about the domain environment.

With the various different knowledge perceptions, a flexible representation approach is required to handle the various information formats. This work proposes a semantic blog, the Knowledge Blog (KBlog), to organise and describe the different understandings of the Ontological Framework in the domain (Figure 3).

The main contribution of the Knowledge Blog is the idea of using a Blog to present the conceptual knowledge. With Blog technology, the knowledge contents are gathered from the individual requirements and research contributions on the web. The KBlog provides the interface to the knowledge of the domain as mechanism of knowledge annotation and facilitates the users to look and find across the blog comparing their knowledge with the others.

Case Studies

In order to illustrate how to use the ontological Framework, this section will present the results from two case studies: an educational and a government based case. LiMe helped produce the ontological framework which was used to develop Semantic Web solutions in each domain.

The following evaluation has been carried out, and feedback was obtained on the development. These web based applications are fully implemented and have been used in a real environment.

Teacher environment

LiMe has been introduced to support the web development for Valaya Alongkorn Rajabhat University (VRU). This university had attempted to implement an e-Learning policy but this did not work in their environment. LiMe was employed to to help improve the teaching and learning environment.

In order to do this, LiMe started from the teaching environment. It mainly supported the teachers in the grading system. In this environment, the activities of students and teachers are homework submission, class attendance, online exam, and grading.

The web developer used LiMe to find useful concepts of the teaching environment from the ontological framework and improved the framework with their teacher working experiences. This provided suitable design requirements and a clear picture before developing the software. Teachers had the opportunity to contribute their requirements.

LiMe was especially useful to reduce the time of the requirement collection. The, it was used to present the environment structure. This structure could be modified or improved to accommodate the individual requirements. The following figure (Figure 4) represents the screen snapshot of the application that used LiMe to design and organize information from the ontological framework.

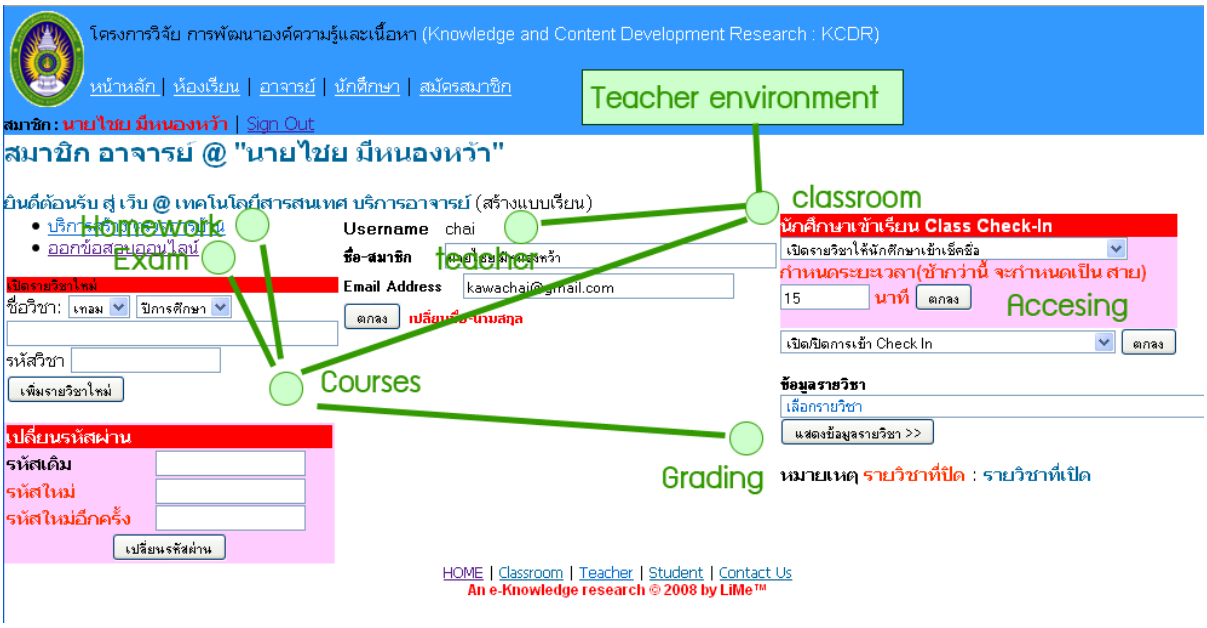

Figure 4: web-based application in the teacher ontological framework.

Faculty environment 1

In this experiment, LiMe has been used to develop the information management for the faculty environment in Thailand. It provided the ontological framework that represented information about faculty. Figure 5 shows the Faculty of Science and Technology at VRU. Faculty improved or modified this framework from their requirements. LiMe improved the budget management framework for every section in the faculty.

LiMe also provided useful features in the operation patterns. It helped define services for each member in the section as service framework. With LiMe, level of services not only is classified but also related to the relevant information from the type of member of staff using the system.

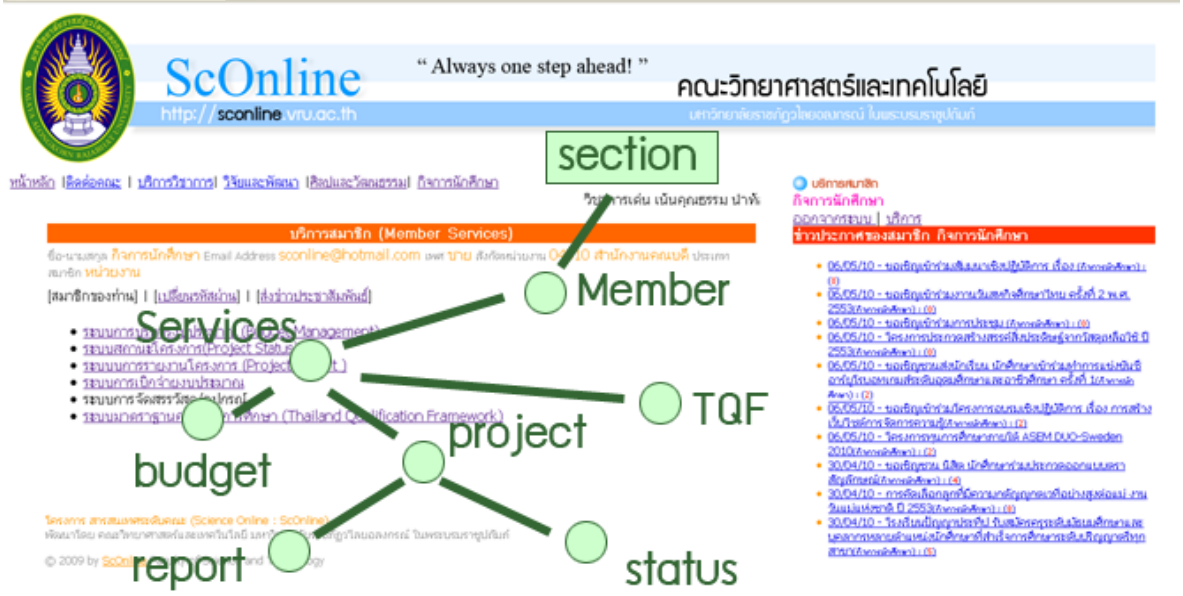

Figure 5: web-based application in the Faculty environment

In addition, the users described their projects within the ontological framework developed from the university framework. This helped establish the required interoperability between the faculties in the university. The process of implementing university strategies and monitoring project quality assurance was also improved.

Faculty environment 2

In this experiment, an ontological framework has been applied to develop and organise the information for the inspection system of the Royal Thai Government (Figure 6).

In Thailand, projects are created from the organisation of Ministries. Many projects contribute to a budget plan. Projects need to be tracked to make sure they are implemented correctly also in remote project areas such villages, and provinces. The inspection serves not only to monitor the processes but also to provide relevant information to the project owners.

LiMe has been used to collect the requirements and design the model of the government inspection. This model will be deployed in the real environment. Therefore, these requirements are very important and need a suitable structure of information to support in the inspection process.

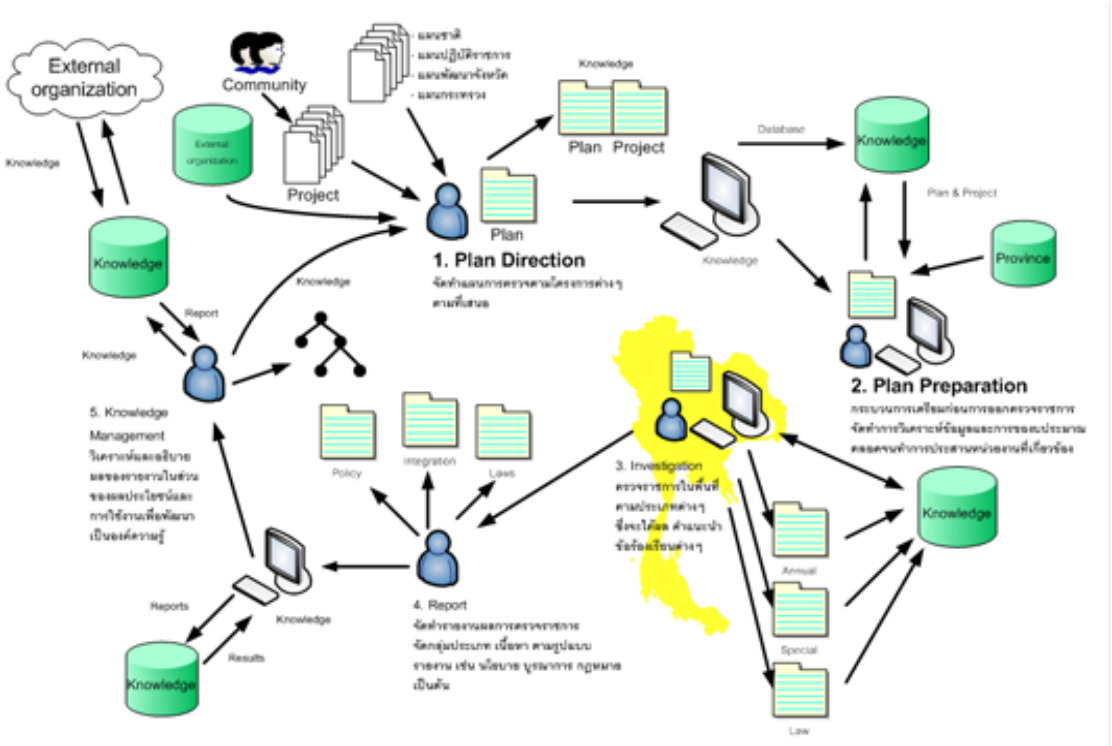

Figure 6: The inspection in Thailand.

Practically, the government inspection has been designed in five processes: plan direction, plan preparation, investigation, report, and knowledge management. An ontological framework was developed for organising and retrieving the information need in the system. It also helped to classify the project problems collected from

various areas. The common understanding of the projects was provided to the inspectors. This information was stored as the central information sources.

The Plan Direction process is the defining process. Problems coming from previous projects will be addressed and used to find solutions or improvements. It involves document classification, risk analysis, and inspection background information. This is the useful information to support the inspectors from the remote area.

The Plan Preparation process is the plan creation. The inspectors will design the tasks, problems, and schedules required by the projects. The relevant information about the remote area, such as contact information, activities, requesting, and others, will be organized to support the task. The topics that needed further information will be developed. The most important information is the project details.

The Investigation process is the data collection process. Information has been captured from the remote areas by the government inspectors. Suggestions and solutions will be provided. These are the results of the project operations. Feedback from the projects is stored in the structured information.

The Report process is the results representation. In order to improve the projects, all information that captured from the remote areas is provided. Different perspectives of the information will be developed and also the comments or suggestions will be added in this process. LiMe applied the ontological framework in the report system. It provided the report designing for the users which allowed modifying the report templates based on the individual requirements.

Lastly, the Knowledge Management process is the core process that applies to every process. It involves information classification. Knowledge is the information used to solve the problem. This is fully supported from LiMe methodology which captured the information, extracted the concepts, developed the ontological framework, and translated it into formal languages.

Basically, the different inspectors introduced different meanings for the information. This is the feature the ontology approach was most useful with. The common understanding of the information will be useful to the environment. The accuracy of accessing the right information from the existing framework was very useful. Knowledge itself could be improved from the descriptions. Therefore, this model will be the more successful, the more members are participating to it. For this reason, the system was designed the experiment as a social network (Figure 7), where members can interact by sharing knowledge, experiences, problems, suggestions, comments, etc, not only as text but also images, and video clips.

Figure 7: This inspector application designing

Conclusions

Results

This research contributed various terms or methods to this research. For example, the term "Knowledge Information" was introduced to represent the crucial information that is extracted from research articles. This KI has been captured and described based on the individual perspectives from the researchers. It is very useful information, especially for the researchers that require the articles related to their research areas. Instead of searching the academic journal websites, they can use this information to retrieve the related information and access the articles from the journal websites.

LiMe has classified knowledge into two different kinds: User-defined requirements and Knowledge Information. The User-defined requirements are knowledge that is contributed by the ontology developer, or domain expert. Knowledge Information is knowledge that is captured from research articles. LiMe represents knowledge by developing the combination between knowledge in an Ontological Framework.

An Ontological Framework is the intermediate information that provides the specification of knowledge in the domain. It has been represented with a hierarchy of concepts which is called taxonomy. LiMe integrates the taxonomies in the domain of interest based on the knowledge topics.

In order to interact with this framework, LiMe proposes the Knowledge Blog to aid the knowledge representation. It has been developed for retrieving, describing, and analysing the knowledge from the domain.

Future Works

LiMe has been proposed as an open environment methodology which extends current methodologies. It is still in the development stage. Therefore, it is available to any developer wishing to use this methodology to develop any Ontologies in any research domain.

To perform at its best, LiMe needs a lot of information about the domain. More knowledge information will produce more Metadata to describe the domain. Therefore, LiMe needs a way to integrate Ontological Frameworks, and it could be improved by applying results from the ontology community working on Ontology merging, Ontology mapping, and Ontology alignment methodologies.

LiMe classifies the knowledge based on the individual topics. Therefore, flexible information will be represented in different ways. Similarity methods are needed to resolve the problems of inconsistency in the Ontological Framework.

In practice, LiMe uses description languages such XML(s), RDF(s), and OWL to share and reuse an Ontological Framework. The specification of these languages or versioning will enhance the reliability to describe the context and characteristics of knowledge in Ontological Framework for individual environment domains.

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Evaluation of Teaching Performance of English Courses by Applying Data Envelopment Analysis and Two-phase Segmentation

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Abstract

Effective teaching performance is a crucial factor contributing to students' learning improvement. Students' ratings of teachers at the end of each semester can indirectly provide valuable information about teachers' performance. This paper selects classes of freshmen students taking a course of English in a university of Taiwan from the academic year 2004 to 2006 as the research object. We adopt the data envelopment analysis, a reliable and robust evaluation method, to identify the relative efficiencies of each class. The calculation is performed in two phases. In phase 1, all the classes are in the same pool. The results of numerical analysis in phase 1 are used to clarify whether the existing teaching methods can achieve the desired results and what are the improved methods. Based on the calculation of phase 1, we segment all the classes into 2 groups according to their contribution of output indicators in calculating efficiency values. The empirical results are expected to identify more objective classes and to reveal that the evaluated classes refer to different efficient classes in different phases and their ranking order changes accordingly. This method can help to provide some concrete and practical teaching strategies for the inefficient classes.

Keywords: data envelopment analysis; English courses; teaching performance; segmentation.

Introduction

English remains an indispensable communication tool and a valuable skill for the English as second language learners who expect to enter the job market. In Asian non-Latin speaking countries such as Taiwan, Japan, China, and South Korea, students often struggle to have a good command of the English language in their professional life. Effective teaching performance is a crucial factor contributing to students' learning improvement. Students' ratings of teachers at the end of each semester can indirectly provide valuable information about teachers' performance. Key performance indicators (KPIs) are measures of accomplishment. Without the evaluation of performance based on key factors and indicators, there will be no permanent change and improvement in the enhancement of the quality of educational institutions (Azma, 2010).

This paper randomly selects 25 classes (among around 250 classes) of freshmen students taking a course of English in a university of Taiwan of the academic year 2004 to 2006 as the research object. We adopt the data envelopment analysis (DEA), a reliable and robust evaluation method, to identify the relative efficiencies of each class. This study focuses on four indicators as an example: two inputs (the course is clearly explained and can easily be assimilated and good communication channels between the teacher and the students) and two outputs (students' satisfaction about their grades and students' learning performance). These four representative indicators were selected among a total of 10 and have passed the Pearson correlation coefficient test. The calculation is performed in two phases. In phase 1, all the classes are in the same pool. The results of numerical analysis in phase 1 are used to clarify whether the existing teaching methods can achieve the desired results and what are the improved

methods. Based on the calculation of phase 1, we segment all the classes into 2 groups according to their contribution of output indicators in calculating efficiency values. The empirical results are expected to identify more objective classes and to reveal that the evaluated classes refer to different efficient classes in different phases and their ranking order changes accordingly.

The remainder of this paper is organized as follows: section 2 (literature review) presents some academic studies in relation with our research. Section 3 (methodology and selected evaluated indicators) introduces the DEA model, explains the method used, presents the data and the important indicators discussed in this paper. Section 4 (empirical results and suggestions) presents the obtained numerical results based on the empirical data which include the efficiency analysis and the segmentation analysis. Section 5 draws the conclusions, limitations and directions of future studies.

Literature review

According to Sanders & Horn (1998), students with comparable achievement levels in second grade had different outcomes in fifth grade because of a large number of variables such as socio-economic status, school, and class size. But the variable which had the greatest impact on student achievement was teacher quality. Because teacher performance is so essential to student accomplishment, many studies have tried to define key performance indicators (KPIs) in order to assess and to improve teacher performance. KPIs are tools used by individuals and organizations to track progress and success. Milken (2000) developed a teacher performance based accountability system in public schools in Arizona using indicators such as teacher skills,

knowledge, and responsibilities, classroom-level student achievement gains, and school-wide achievement gains.

In 2002, the National Committee for the Evaluation of the University System (CNVSU) organized in Italy an expert team to devise a teaching evaluation questionnaire, the Short Form Questionnaire (SFQ), to ensure homogenous evaluation in all Italian universities (Iezzi, 2005). The SFQ defined several indicators, such as the structure of the degree, the organization of the course, didactic activity and study, infrastructures, and interest and satisfaction.

Loveland and Loveland (2003) discussed a large number of suggestions for improving the ratings of 10 factors identified as significant such as (in order of priority) knowledge of the subject, communication skills/ability, enthusiasm for the subject, encouragement of student participation, rapport with students, fairness in grading, timeliness in providing feedback, organization of class, adequacy of text-book and other learning materials, and instructor's preparation for class.

Wolf et al. (2004) described the weaknesses (poor delivery of course contents, being disorganized, inaccessible, and displaying weak teaching skills) and the qualities (being a knowledgeable and strategic teacher, creating a positive learning environment, demonstrating professionalism, demonstrating positive personal traits, and displaying scholarly traits) in faculty teaching performance.

Johnes (2006) applied Data envelopment analysis (DEA) to measure the performance of Higher Education institutions (HEIs). This study uses an output-oriented approach

and indicators such as score based on best 3 A levels or equivalent, gender, school, % of graduates who are female, % of graduates who did not attend an independent school, and pass/other. Johnes (2006) shows that measures of the efficiency of departments derived from individuals' efficiencies are much more highly correlated with department level efficiency scores.

Martin (2006) applied DEA methodology and selected indicators concerning both the teaching and the research activity of the departments of the University of Zaragoza (Spain) in order to assess their performance. The inputs selected were human resources, financial resources and material resources; the outputs were credits registered × experimental coefficient, Ph.D. credits offered, Ph.D. completions, annual research incomes, and scientific production index.

McGowan & Graham (2009) highlighted four indicators contributing most to improved teaching: active/practical learning, teacher/student interactions, clear expectations/learning outcomes, and faculty preparation.

Wu and Li (2009) constructed a performance measure indicators system for higher education using four perspectives: financial, customer, internal process, and learning & growth. Zhou and Wang (2009) applied DEA to analyze the efficiency of 16 universities in China. Their performance indicators are teachers as labor power index, financial power, physical power, number of graduates, and scientific research.

Montoneri et al. (2011) applied DEA to assess the performance of English writing courses in a university of Taiwan and selected four indicators: preparation of teaching

contents, teaching skills, fair grading, and students' learning performance. They showed that the evaluated classes may refer to different facet reference sets according to their actual values located in lower or higher ranges. As a result, inefficient evaluated classes may compare themselves with efficient evaluated classes in their range and make improvement little by little.

Various studies have been conducted on the KPIs of evaluation, but there is little consensus concerning the choice of indicators to assess the performance of teachers and educational institutions. The main purpose of this research is not to decide which indicators are the most suitable, but to find the more important indicators and help to formulate improvement suggestions for educators.

Methodology and selected evaluated indicators

The efficiency assessment is often conducted by DEA which can measure the relative efficiency of educational institutions from commonly available performance indicators. This paper uses DEA to investigate the indicators contributing to teaching performance in a university of Taiwan. We use students' ratings of teachers (questionnaires filled at the end of each semester) about the course they follow.

Origins and application of DEA

The starting point of DEA is attributed to Farrell's seminal 1957 paper (Førsund and Sarafoglou, 2002). In his study, Farrell introduced his concept of efficiency measurement. This concept became more popular after Charnes, Cooper, and Rhodes (1978) developed Farrell's efficiency measurement concept. Their method, the so-called "Charnes-Cooper-Rhodes (CCR) model" or "CCR model" includes the

function and concept of benchmarking and introduced the concept of multiple inputs and multiple outputs. The CCR (ratio) model is nowadays the most widely used DEA model. If the efficiency value of the CCR model equals 1, the evaluated unit is efficient (of optimal performance); if the efficiency value is less than 1, the evaluated unit needs some improvement (Lin et al., 2009; Lee, 2009).

DEA is a reliable and robust evaluation method which has notably been applied to assess the efficiency of educational institutions (Ahn et al., 1989; Johnes & Johnes, 1993; Ng & Li, 2000; Abbott and Doucouliagos, 2003; Johnes, 2006; García-Aracil and Palomares-Montero, 2008). It has also been applied more recently to assess the performance of various courses (Mathematics and Science in Ismail, 2009; English writing courses in Montoneri et al., 2011).

DEA model

This paper adopts the evaluating method—DEA to perform the efficiency evaluations of a course of English for freshmen from various departments. We investigate the relative efficiency of decision-making units (DMUs), that is, the evaluated classes. The DMUs' relative efficiency values are calculated under an output oriented CCR model. According to Montoneri et al. (2011), minimizing input indicators in order to obtain an efficiency value equal to 1 can mislead educators. Therefore, the output oriented model is more suitable than an input oriented model, notably because it can emphasize on how much the insufficiency of the output performance is under the current input resources without additional input efforts.

Data selecting—input and output indicators

The data source

The study case is a private university established in 1956 in Taiwan. There are approximately 11,000 undergraduate students in the university. The data comes from the university's online student rating system, which provides student feedback to professors at the end of each semester. Students are required to fill out the questionnaires.

The characteristics of the research object are as follows:

1. Freshmen students in a university of Taiwan from the academic year 2004 to 2006.
2. The classes are randomly selected from around 250 classes among 21 departments. English majors from the Department of English Language, Literature and Linguistics are not included.
3. English is a required course for freshmen for all the departments of the studied university. All the classes follow a similar course to meet the homogeneity of the evaluated object.
4. The English course is a 2-credit course (2 hours/week). Each teacher can choose the text-book of his/her choice. Most of the teachers propose group discussions and role plays during the class.
5. A total of 25 classes taught by full-time and part-time teachers are selected as the decision making units (DMUs), that is, the evaluated units. They are named from D1 to D25.
6. Among the selected departments for this research: Department of Mass Communication, Department of Law, Department of Chinese Literature,

Department of Social Work and Child Welfare, Department of Applied Chemistry, Department of International Business, Department of Accounting, Department of Tourism, Department of Computer Science and Information Engineering, and Department of Finance.

The characteristics of the data source are as follows:

1. The data are based on questionnaires (10 questions) filled out by the students at the end of each semester for each class. Each question is rated from 1 (very unsatisfied) to 5 (very satisfied) by the students.
2. This paper aims at providing a method to identify the indicators contributing to teaching performance; this method can be applicable to different kinds of data and various types of courses.
3. To ensure the reliability of the questionnaires, at least half of the class must answer seriously. If a student gives ratings too different from the rest of the class, he/she is excluded.
4. The average scores of each question undergo a correlation analysis to test the reliability of the ratings and to find representative indicators in this study.
5. The data concerning the selected indicators is fed in the software Frontier Analyst to calculate the performance values of each evaluated class.

After the rule of thumb, the number of evaluated units is suggested to be two times or even four times the number of indicators. Based on the questionnaires, four indicators are appropriate in the current research. The indicators selected for the evaluation model are abbreviated by I1, I2 and O1, O2 respectively and presented.

Input indicators

I1. Course clearly explained and easily assimilated: it refers to the degree of teachers' professional knowledge for the preparation of the course.

I2. Good communication channels between the teacher and the students: it indicates whether the teacher can actively answer students' queries and clear their doubts. It signifies whether teachers can adapt to students' learning habits and their learning channels. This indicator may increase students' learning interest and learning motivation.

Output indicators

O1. Students' satisfaction about their grades: students fill the questionnaire before the end of the semester; therefore this indicator should not represent students' immediate response to one particular grade, but a general appreciation of the fairness of grading during the whole semester.

O2. Students' learning performance: it indicates students' self-recognition of learning performance after receiving a period of language training. This indicator relates teacher quality to student achievement.

Correlation analysis of input and output indicators

As mentioned in Lin et al. (2009), the Pearson correlation coefficient test is often used to verify whether the correlation is high among variables. A closer relation between two variables means that their correlation coefficient is higher, while less correlated variables have a lower correlation coefficient. Generally speaking, a Pearson correlation coefficient of 0.8 or above represents a very high correlation; a value of 0.6 to 0.8 represents a high correlation; a value of 0.2 to 0.4 represents a low correlation; the value inferior to 0.2 represents an extremely low correlation or not

correlated. The correlation coefficients among the four selected indicators listed in Table 1 below are all above 0.8 with a significant level of 1%. This shows a very high degree of correlation. The principle of isotonicity is satisfied.

Table 1. Pearson correlation coefficients between input and output indicators.

Inputs / Outputs	I1 (Course clearly explained and easily assimilated)	I2 (Good communication channels between teacher and students)
O1 (Students' satisfaction about their grades)	0.851*	0.928*
O2 (Students' learning performance)	0.925*	0.936*

Notes: 1. * denotes significant levels at 1%.

Empirical results and suggestions

The 25 DMUs' relative efficiency values are calculated under an output oriented CCR model of DEA and are conducted in two phases. In phase 1, all the 25 DMUs are in the same pool. The results of numerical analysis in phase 1 are used to clarify the relative efficiency of each DMU and the indicators' contribution in calculating efficiency value. In phase 2, the 25 DMUs are segmented according to their output indicators' contribution in calculating efficiency value acquired in phase 1. The purpose of this segmentation is to regroup DMUs of similar characteristics and to identify the more objective DMUs which are suitable for designing questionnaires concerning teaching performance evaluation. This study can provide suggestions to teachers about how to make a better use of limited teaching resources in order to increase their teaching efficiency in short term.

DMUs' efficiency analysis in phase 1

Table 2 lists some performance indicators of the DMUs which are ranked by descending order of "Efficiency value". The DMUs with an efficiency value equal to 1 are efficient can constitute "reference sets" which form efficiency frontier curves. If the efficiency value is less than 1, the evaluated unit is inefficient. The efficient DMUs are the referring standards for other inefficient DMUs. The efficiency value of each DMU is calculated by the distance of their locations to the efficiency frontier curves. The results show that the average efficiency of all the DMUs is 0.968; that of the inefficient ones is 0.962. The efficiencies of the DMUs D15, D20, D19 and D16 in phase 1 show the best performance with value of 1. That is, they are all on the efficiency frontier curves without the need of further improvement in the inputs and outputs. The inefficient DMUs can improve their efficiency by referring to the efficient DMUs of their reference set.

The input and output indicators' contribution in calculating DMUs' relative efficiency values gives information about their importance. As a result, the values listed in Table 2 allow us to identify which inputs and outputs have been used or not in determining efficiency. For example, the contributions of O1 (students' satisfaction about their grades) and O2 (students' learning performance) in calculating D15's relative efficiency values are 71.7% and 28.3%, respectively; and the contribution values of I1 (course clearly explained and easily assimilated) and I2 (good communication channels between the teacher and the students) are 0% and 100%, respectively. This means that for D15, students' satisfaction about their grades is almost 3 times more important than students' learning performance in calculating its relative teaching efficiency, which is only influenced by the input indicator I2; that is, the good

communication channels between the teacher and the students. The input and output indicators' average contributions for all the DMUs reveal that O2 and I2 are the major indicators in the efficiency evaluation of studied empirical example, with 61.3% and 80.9%, respectively. That is, generally speaking, the students' learning performance is the major output indicator and the good communication channels between the teacher and the students is the major input indicator.

Suggestions. In order to improve teaching performance, teachers of inefficient DMUs should emulate the efficient DMUs of their reference set and focus on enhancing the communication channels, adapt to students' learning habits and their learning channels, such as language learning websites, learning software, online courses, mobile phones, Twitter, Facebook, blogs, etc., in order to give them enough learning support during and outside the class. Consequently, students' learning motivation and performance will be increased accordingly.

Table 2 Relative performance indicators of DMUs in phase 1

DMU name	Efficiency value	Rank	Reference set	Contribution in calculating efficiency value (%)			
				O1	O2	I1	I2
D20	1.000	1	D20	26.1	73.9	0.0	100.0
D16	1.000	1	D16	95.7	4.3	81.6	18.4
D19	1.000	1	D19	74.5	25.5	0.0	100.0
D15	1.000	1	D15	71.7	28.3	0.0	100.0
D22	0.990	5	D20	0.0	100.0	0.0	100.0
D24	0.986	6	D15, D19	72.3	27.7	0.0	100.0
D13	0.985	7	D15, D20	0.0	100.0	12.5	87.5
D7	0.980	8	D15, D20	0.0	100.0	12.1	87.9
D17	0.978	9	D15, D19	72.3	27.7	0.0	100.0
D1	0.975	10	D15, D20	0.0	100.0	12.6	87.4
D25	0.969	11	D15, D19	72.7	27.3	0.0	100.0
D21	0.967	12	D15, D20	0.0	100.0	12.3	87.7
D10	0.963	13	D15, D20	26.4	73.6	0.0	100.0
D9	0.960	14	D20	0.0	100.0	0.0	100.0
D4	0.959	15	D15, D20	0.0	100.0	12.5	87.5
D14	0.959	16	D15, D20	0.0	100.0	12.2	87.8
D5	0.957	17	D15, D19	72.5	27.5	0.0	100.0
D3	0.957	18	D15, D20	0.0	100.0	12.4	87.6
D12	0.956	19	D15, D19	72.1	27.9	0.0	100.0
D2	0.956	20	D15, D20	0.0	100.0	12.3	87.7
D23	0.950	21	D15, D16,	96.0	4.0	82.5	17.5
D11	0.950	22	D19	71.7	28.3	0.0	100.0
D18	0.947	23	D15, D19	0.0	100.0	12.6	87.4
D8	0.943	24	D15, D20	72.2	27.8	0.0	100.0
D6	0.920	25	D15, D19	71.9	28.1	0.0	100.0
			D15, D19				
Average of all the DMUs	0.968			38.7	61.3	11.0	89.0
Average of the inefficient DMUs	0.962			33.3	66.7	9.2	90.8

Note: O1 is "students' satisfaction about their grades"; O2 is "students' learning performance"; I1 is "course clearly explained and easily assimilated"; I2 is "good communication channels between the teacher and the students".

DMUs' efficiency analysis in phase 2 — Segmentation of DMUs by output indicators' contribution

Based on the calculation of phase 1, we segment all the DMUs into 2 groups according to their output indicators' contribution in calculating the relative efficiency. The DMUs with O1's contribution superior to 50% are classified as the group O1

which contains 12 DMUs: D16, D19, D15, D24, D17, D25, D5, D12, D23, D11, D8 and D6. The DMUs with O2's contribution superior to 50% are classified as the group O2 which contains 13 DMUs: D20, D7, D10, D13, D22, D1, D21, D14, D2, D4, D3, D9 and D18. For example, D16 belonging to group O1 has O1's contribution (95.7%) superior to that of O2 (4.3%).

In phase 2, the calculation of each DMU's relative efficiency is separately conducted in the two groups and the efficient frontier curves are reconstituted in the two different segmented groups. Table 3 includes each DMU's relative efficiency, rank order and output indicators' contribution in calculating relative efficiency in phase 1 and phase 2. The results reveal that:

One new efficient DMU appears in phase 2. The 3 efficient DMUs (D16, D19, and D15) in phase 1 are still efficient in phase 2; but one more DMU (D7) becomes efficient in phase 2 and is located in the segmented group O2. Because the segmentation according to output indicators' contribution makes the new reconstituted frontier curves in group O1 now closer to the O1 value and in group O2 now closer to the O2 value, this results in a new efficient DMU appearing in group O2 in phase 2.

The DMUs of group O1 are more influenced by O1 in phase 2 than in phase 1; the DMUs of group O2 are more influenced by O2 in phase 2 than in phase 1. This phenomenon can be proved by the slightly increase or by the same efficiency value in phase 2 than in phase 1.

Inefficient DMUs refer to different efficient DMUs in different phases. Because 3 of the 4 efficient DMUs in phase 1 now belong to group O1, one other efficient DMU belongs to group O2. This implies that after the segmentation, the efficient frontier curves are recalculated and the efficient DMUs can probably be changed; some of the inefficient DMUs in group O1 originally referring to the efficient DMUs which are now located in group O2 have to refer to different efficient DMUs, because they are in different pools. For example, the two inefficient DMUs of group O2, D1 and D21, originally referred to the efficient DMUs D15 and D20 in phase 1; because D15 is located in group O1 in phase 2, they refer to the efficient DMUs D20 and D7 instead.

Ranking order changes in different phases. In group O1, the 12 DMUs' ranking order in phase 1 is the same as that in phase 2; however, in group O2, the 13 DMUs' ranking order in phase 1 is different from that in phase 2. For example, D22, D1, D21, D4, and D9 have higher rank in phase 1 than in phase 2; and D7, D10, D14 and D2 have lower rank in phase 1 than in phase 2. Only 4 DMUs in group O2 keep the same ranking order as in phase 1. There is one new efficient DMU in group O2 because the new frontier curves are closer to O2 in phase 2. Group O2's efficiency values are equivalent or slightly higher in phase 2 than in phase 1.

More objective DMUs appear. In group O2, the major indicator of DMUs D7, D10, D4 and D18 changes from O2 to O1. It implies that these four DMUs are more influenced by the presence of other DMUs and are less objective concerning the result of teaching efficiency. As for the DMUs in group O1, their major indicator is still O1. Therefore, except D7, D10, D4 and D18, all the DMUs of group O1 and O2

are more suitable for designing questionnaires concerning teaching performance evaluation.

Table 3. DMUs' relative efficiency ranks and output indicators' contribution in two phases

Group O1							Group O2						
Unit name	Rank in phase		Relative efficiency in phase		Contribution of O1 in phase		Unit name	Rank in phase		Relative efficiency in phase		Contribution of O2 in phase	
	1*	2	1	2	1	2		1**	2	1	2	1	2
D16	1	1	1.000	1.000	95.7	100.0	D20	1	1	1.000	1.000	73.9	100
D19	1	1	1.000	1.000	74.5	100.0	D7	4	1	0.980	1.000	100.0	0
D15	1	1	1.000	1.000	71.7	71.7	D10	7	3	0.963	0.991	73.6	0
D24	4	4	0.986	0.986	72.3	72.3	D13	3	3	0.985	0.991	100.0	100
D17	5	5	0.978	0.978	72.3	72.3	D22	2	5	0.990	0.990	100.0	100
D25	6	6	0.969	0.969	72.7	72.7	D1	5	6	0.975	0.978	100.0	100
D5	7	7	0.957	0.958	72.5	72.5	D21	6	7	0.967	0.978	100.0	100
D12	8	8	0.956	0.956	72.1	72.1	D14	10	8	0.959	0.973	100.0	100
D23	9	9	0.950	0.950	96.0	96.0	D2	12	9	0.956	0.967	100.0	100
D11	10	10	0.950	0.950	71.7	71.7	D4	9	10	0.959	0.967	100.0	0
D8	11	11	0.943	0.943	72.2	72.2	D3	11	11	0.957	0.965	100.0	100
D6	12	12	0.920	0.921	71.9	71.9	D9	8	12	0.960	0.960	100.0	100
							D18	13	13	0.947	0.951	100.0	0

Note: *: Group O1's rank in phase 1 means that their new rank does not consider the presence of group O2's DMUs. ****:** Group O2's rank in phase 1 means that their new rank does not consider the presence of group O1's DMUs.

Conclusions and suggestions

This paper applies DEA to calculate the relative efficiency values of 25 evaluated classes under an output oriented CCR model. The calculations are conducted in two phases. In phase 1, all the 25 DMUs are in the same pool. The results are used to clarify the relative efficiency of each DMU and the indicators' contribution in calculating efficiency value. All the inefficient DMUs of group O1 (D24, D17, D25, D5, D12, D23, D11, D8 and D6) are suggested to concentrate teaching effort on indicator O1 (students' satisfaction about their grades) in order to increase their relative efficiency in short term. Teachers are suggested to announce grading criteria as clearly and early as possible in order to guide students and to answer their questions and doubts before the exams. After the exams, teachers should give a correction and advices to students. Students who have a bad grade sometimes give up and drop the class. Under these circumstances, communication channels between the teacher and the students should be fast and clear. Students need to feel that teachers care about them. In addition, teachers can offer them some help after the class or during the office hours. Students need to know why they failed, and more important, what they can do to improve their level. This will help enhance students' learning motivation and increase the value of O2 (students' learning performance) at the same time. All the inefficient DMUs of group O2 (D17, D25, D5, D12, D23, D11, D8 and D6) are suggested to concentrate teaching effort on indicator O2 in order to increase their relative efficiency in short term. Teachers can offer students help outside the class (teaching website, English corner, office hours).

In phase 2, the 25 DMUs are segmented according to their output indicators' contribution in calculating efficiency value acquired in phase 1. The purpose of this

segmentation is to regroup DMUs of similar characteristics and to identify the more objective DMUs which are suitable for designing questionnaires concerning teaching performance evaluation. The analysis of phase 2 shows that except D7, D10, D4 and D18, all other DMUs are more suitable for designing questionnaires. It means that on 25 DMUs, 21 can provide reliable information to educators and decision-makers. The results may of course vary according to the year, the subject matter, the departments and the classes selected.

This paper proposes a method to find out the more important evaluated indicators and help to formulate improvement suggestions for educators in Taiwan concerning English courses for freshmen. Our demonstration on how to screen primary indicators can be useful for further studies in other countries or fields. The results of this paper can serve as a model for decision-makers to design the educational policies satisfying the objectives of enhancing the competitiveness of educational institutions. The results of the study need to be interpreted in light of its limitations. DEA only gives efficiencies relative to the data considered. This paper offers suggestions to teachers on how to improve their teaching according to four selected indicators. Future studies could propose to analyze other indicators and conduct research on teachers' response to student ratings.

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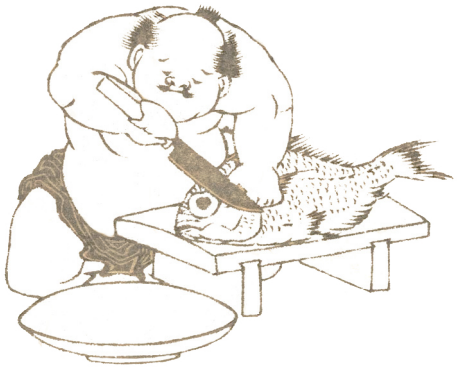

Practical Consideration of Pair Problem Solving in Computer Literacy Education

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Abstract

Direct instruction to students enrolled in a computer literacy program at the undergraduate level frequently involves difficulties due to varied knowledge levels and skills among the students, as well as an increase in the number of unmotivated students. An available solution is the pair problem solving approach which can prove to be effective as an effective method. This report shares the findings of an investigation regarding the efficacy of pair problem solving, as compared to individual problem solving in computer literacy education. Furthermore, the paired approach analysis was able to extract specific criteria for successful pairs. The research, which included two (paired and individual) 15-minute practical examinations and questionnaires, a test on basic scholastic ability, and a survey on PC experiences, was conducted with approximately 280 students from three universities who were enrolled in a computer literacy program in 2008 and 2009. The results reveal that the overall scores of the pairs exceeded those of the individuals. Moreover, more than 90% of students found pair problem solving to be a positive experience. From the viewpoint of learning effectiveness, it is worth mentioning that the most effective pair combinations included those with a small difference in basic academic ability, a large difference in PC experience, and a partner of the opposite sex.

Keywords: pair problem solving, computer literacy

Introduction

With the advent of declining university enrollments, university instructions are becoming difficult to be followed because of different cognitive and behavioral characteristics observed in students, such as lower academic ability and intellectual curiosity (Figure 1).

The skills needed to operate a computer have diversified and the computer literacy gap has expanded.

Because of this, there have been arguments for the necessity to strictly review educational content and methodology particularly for computer literacy education (Murakami et al., 2008). Given the current situation, interactive and participatory approaches for effective instructions that focus on the student have been taking place. It has been reported that cooperative learning is very effective in research and in practice, particularly for pairs and small groups. Therefore, the expectations from these methods are increasing (Yasunaga, 2008, Tachibana et al., 2010).

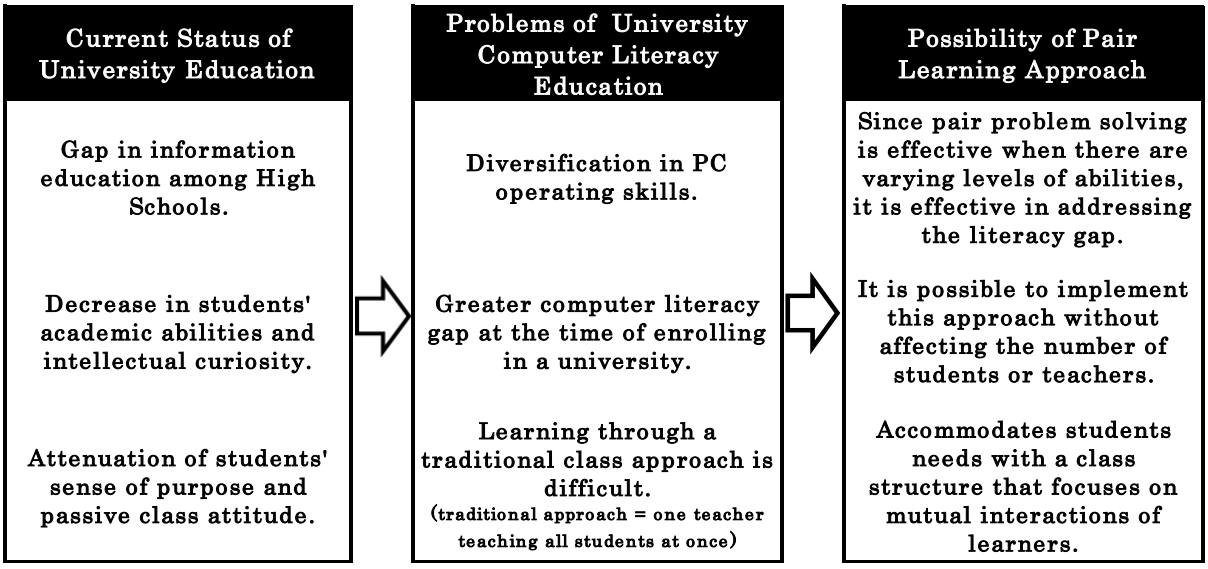

Figure 1 Background of research

The effects of the pair approach within information education suggest possibilities, such as encouraging information literacy, and stimulating students' desire to learn, (Takahashi et al., 2004) as well as improving their ability to complete tasks, solve problems, and learn independently (Terakawa et al., 2005). On the other hand, there are indications that depending on the pair combination, there may not always be an effect on learning or that there might be issues with developing methods to form effective pairs (Kaneko et al., 2007, Takahashi et al., 2010). However, regardless of the numerous reports on the subject, there is a lack of understanding of pair combinations or combination criteria because there are few studies that deal with this issue. Keeping this in mind, the authors of this study introduced a pair approach into university computer literacy education in 2008. They examined the effectiveness of this approach by comparing individual problem solving with pair cooperative problem solving and verifying the effects pair combinations have on the results. Thus far, it is evident that pair cooperative problem solving improved the overall task achievement level and was particularly effective for students with lower grades and with mixed-gender pairs (Uchida et al., 2010). The students' assessment of pair learning was high, indicating that this method was effective in meeting students' needs (Uchida et al., 2010). However, this method also has certain disadvantages such as striking differences observed between pair results and either no or negative effects with certain pair combinations.

This study first reports the problem solving results with pairs from a pair combination criteria perspective based on the results of pair solving approach in class, conducted from 2008 to 2009. It also focuses on the problem-solving process as an index for learners' awareness toward working as pairs as well as the quantitative changes in

utterances among pairs, as a means to examine the issues of problem solving for selected pairs. Finally, the study considers the pair learning effect from the amount of utterances and survey results to determine how cooperative problem solving is effective through conversation and student trends.

Methodology

The subjects of this study were enrolled in a computer literacy program in 3 departments of 2 private universities in Aichi Prefecture. A total of 7 classes and 280 students participated each year for 2008 and 2009. In April, students were surveyed on pair combination criteria and in July, experimental classes were held for pair testing (Figure 2).

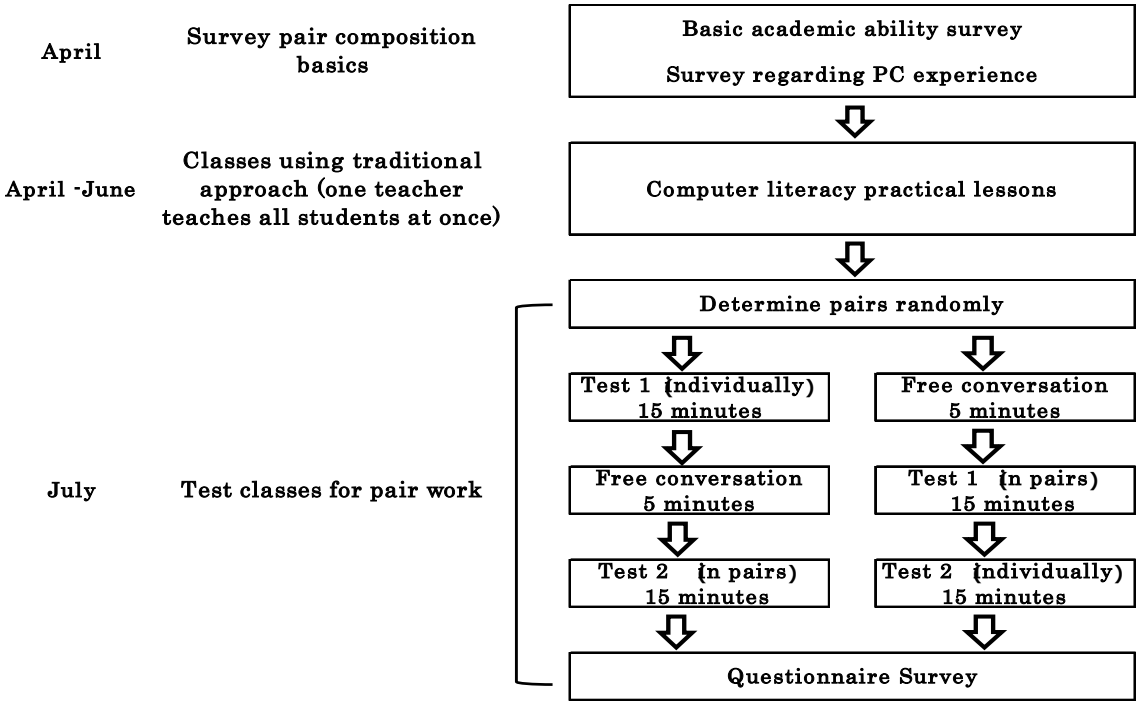

Figure 2 Outline of the study

Pair Combination Criteria

In 2008, students were surveyed on their basic academic ability, computer experience, interest in computers, and typing speed in order to gain basic data regarding the pair combination criteria. Of these four criteria, a prior study has acknowledged the relationship between basic academic ability and scholastic performance of students after enrolling in university, adapting to university education, and scores in the national exams. Three other items reflected computer literacy before university, which is the basic premise for computer literacy education, and were included because objective data on them is relatively easy to obtain.

Given the results of 2008, the 2009 survey focused on 2 indicators; basic academic ability, which implied involvement in problem solving and performance in pairs, and computer experience before university.

The basic academic ability survey consisted of 20 math and *kanji* (Japanese character) problems and used an adjusted difficulty level so that performance would approximate a normal distribution. Math problems were composed of basic math problems developed to measure university students' academic abilities. *Kanji* problems referenced the *kanji* test that measures basic Japanese ability. The survey lasted 20 minutes and surveys were collected individually for each participant.

The survey on computer experience before university had 20 multiple-choice questions about the Internet, software, and computer usage inside and outside the school. In the 2008 survey, there were few questions and the multiple choice answers varied based on the question. The 2009 survey improved on these two issues. The

survey time lasted 5 minutes and surveys were collected individually for each participant.

Pair Problem Solving

After 8–10 practical computer literacy classes, students were tested (Test 1 and Test 2) individually and in pairs for 15 minutes (22 questions) based on word-processing proficiency. Pair groupings were randomly selected to determine the effect of pair combination criteria. Then, students in each department were divided without bias per class. Approximately half of the students took Test 1 individually followed by Test 2 in pairs. The remainder of the class took Test 1 in pairs followed by Test 2 individually. In each of the divided groups, almost all students were in the same year of school and from the same academic discipline. Since one teacher taught the same material to both groups, the difference between the groups is presumed to be negligible. During the test, students solved problems in pairs and individually, and the results were collected individually for each participant. According to preliminary investigation, the dispersion for Test 1 and Test 2 was set to a certain level adjusting the difficulty level so that the average variance of correct responses differed by 15 to 20 percent. Furthermore, in order to eliminate the issues with testing order in 2009 and 2008, the tests were conducted in the reverse order (switching Test 1 and Test 2).

Before the pair test, students were given five minutes for free conversation to develop smooth communication for each pair's first encounter. Twenty minutes of conversation was recorded from the time free conversation began to the end of the pair test. After the test, the students took a survey about their method of problem solving in pairs. The 2009 survey improved upon the issues with multiple choice

expressions that were apparent during the 2008 study. The survey time lasted 5 minutes and surveys were collected individually for each participant.

Analysis of Results

The analysis of the results employed a standard deviation as a standardized score to comparatively examine the values from Test 1, Test 2, basic academic ability, and computer experience. The amount of utterance was determined by converting the conversations recorded during the pair tests into text. The number of times students spoke was treated as the amount of utterances and the number of characters was treated as the utterance character count. The analysis of the pair results used in this study consists of the values that were calculated by subtracting the individual test scores (standard deviation) from each subject's pair test scores (standard deviation), added according to pairs.

Results and Interpretation

Outline

Looking at the results from the individual and pair practical tests 1 and 2, the pair tests (average standard deviation: 50.65 in 2008 and 51.62 in 2009) surpassed the scores from the individual test (average standard deviation: 49.34 in 2008 and 48.36 in 2009) ($\rho = 0.0015$ for 2008 and $\rho = 0.0001$ for 2009). As an overall trend, this indicates that the task achievement level improves through pair problem solving. However, from an individual perspective, there was either no difference between the pair and individual results or the pair results were negative for close to 40% of students. On examining the relationship between pair and individual tests, trends were indicated in which pair problem solving had relatively less effect for students who

scored high in the individual test, while students who scored lower improved (Figure 3). Previous research has also extrapolated that working in pairs is more effective for students with lower grades.

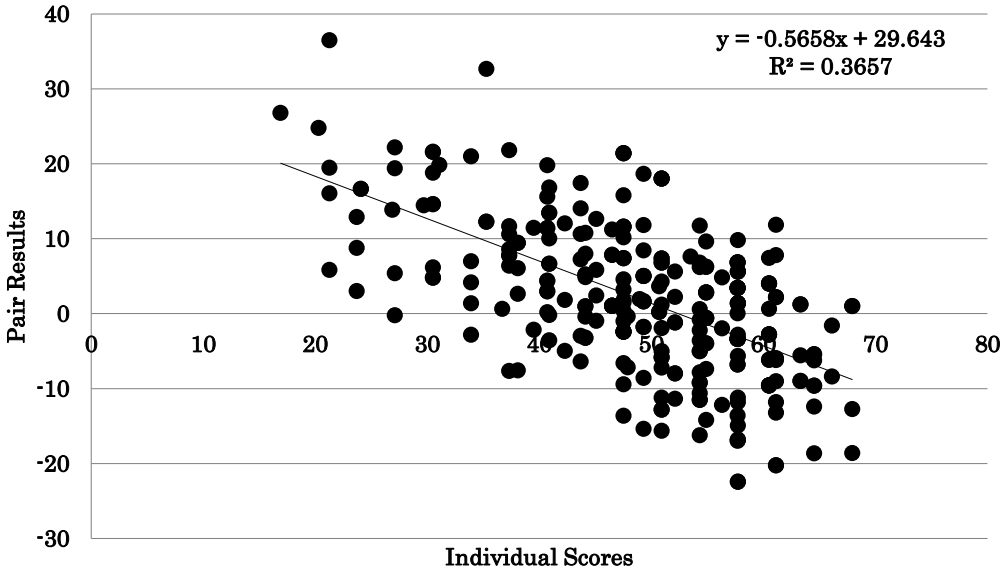

Figure 3 Individual scores and pair results

Criteria for Pair Combination

Table 1 Pair Results and Pair Combination Criteria

Pair Combination Criteria	H (High Pair Results)			L (Low Pair Results)			t value	ρ
	n	m	s.d.	n	m	s.d.		
Basic Academic Ability Difference	92	8.85	6.24	36	14.45	8.29	3.63	0.001 **
Difference in PC Experience	92	8.88	6.81	36	7.17	6.86	1.26	0.211

**ρ<.01

As for the criteria for pair combination, analysis was conducted for two indicators suggested to be effective in the 2008 study, computer experience before university and basic academic ability (Table 1). Group H with a pair score above +10 and Group L with a score below −10 were selected in order to examine the characteristics of the

pair learning effect. A comparison of groups H and L indicated that the basic academic ability gap was small. The reason for this is that the gap in basic academic ability reflects the level of high school that students came from, the academic discipline, desire to learn, and class attitude. It is possible that these disparities affect the amount and quality of communication in pair testing. On the other hand, trends indicated that the gap in computer experience was greater in Group H and lesser in Group L, although the difference between the two was insignificant. The idea was that students with richer experience taught the students who lacked experience, which made the pairs more effective. However, the hypothesis is that for pairs with a lower computer experience, students would get stuck or need help in the same places, and although they consulted each other, they could not solve the problems.

Table 2 Pair Results by Gender and Amount of Conversational Utterance

	Pair Gender	Pair Results	Amount of Conversational Utterance
Male	same	0.85	2138.3
	mixed	6.3	2114.8
Female	same	1.68	2200.1
	mixed	4.3	2127.4

In addition to the two indicators—basic academic ability and computer experience before university—it was clear that gender was a factor in problem solving and performance. Males uttered less overall and male gender pairs were less effective, while mixed-gender pairs were more effective (Table 2). On the other hand, females overall were more vocal, although the result was that females vocalized more with same gender pairs as opposed to mixed-gender pairs. However, females achieved greater results with mixed-gender pairs as opposed to same gender pairs. Furthermore,

there was a high correlation between the amount of utterances and the pair results with females than with males. The outcome determined that mixed-gender pairs are more effective, followed by female pairs with male pairs being the least effective.

From the above results, it can be concluded that the most effective pair combinations have a small gap in basic academic ability, a large gap in computer experience, and a partner of the opposite sex.

Pair Learning Effect and the Amount of Utterances

The vocal data (roughly 100 per year) collected during the pair test was converted into text. The conversation was analyzed by the amount of utterances and the character count of the utterance.

There was a strong correlation ($r = 0.98$, $y = 19.3x$) between the amount of utterances and utterance character count. The average number of times students uttered during the 15 minute, 22 question (Q1–Q22) pair test was 106.0 and the average utterance character count was 2107. In other words, it was evident that there were 7 conversational exchanges every minute and they spoke roughly 20 characters at a time. Moreover, depending on each pair, the utterance character count was disproportionate (highest was 4733 characters and lowest was 83 characters) and there was a large difference between the test results. Examination of the relationship between the overall utterance and pair results showed that vocal pairs were more effective (Figure 4, $r = 0.42$).

Looking at utterances for each question, there was more utterance for Q2 (insert a page number in the center of footer) in Test 2, which had a character count of 342, than Q9 (create an autoshape, and insert characters) in Test 1, which had a character count of 188. From these results, we can conclude that depending on the pair, there was a communication gap and a significant increase in utterances for problems with functions including a lot of steps or functions that were used less frequently during the class.

Looking at the changes in utterances over time, utterances increased in the latter half of Test 1, which had a higher average score, and the utterance was particularly high for Q13–Q18. In contrast, Test 2 had higher utterances for Q1–Q11 with significant reduction in the latter half. Furthermore, there was a difference between Test 1 and Test 2 for the pair learning effect by problem.

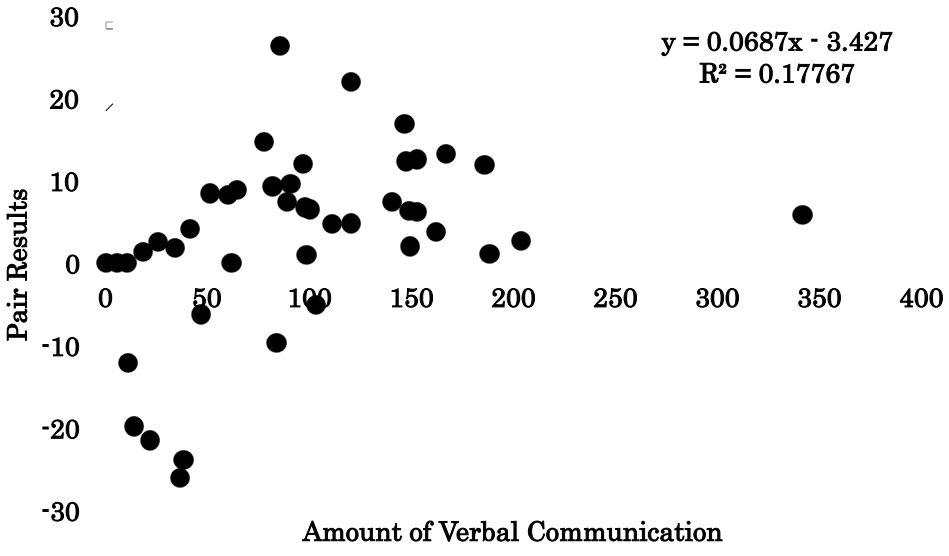

Figure 4 Relationship between pair results and amount of conversational utterance

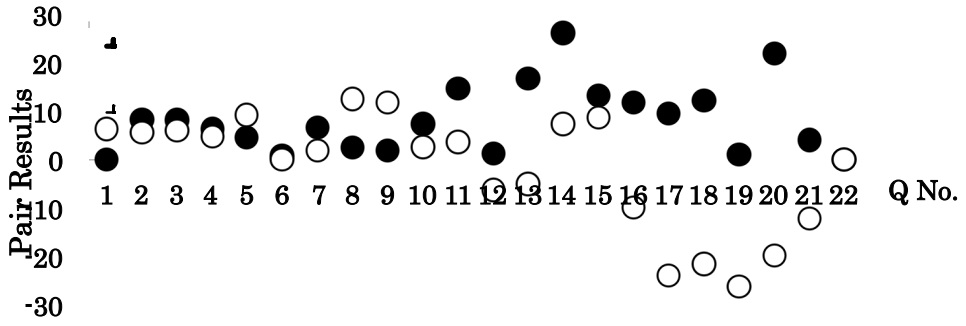

Figure 5 Pair results by each question（● –Test1 ○ –Test2）

While it was more effective in questions Q13–Q18 for Test 1, Test 2 indicated negative values for Q16–Q21, which was lower than individual scores (Figure 5). Compared to Test 1, the difficulty level for Test 2 was slightly higher. This led students to spend more time communicating during the pair test, leaving less time for them to solve problems in the latter half of the test.

As demonstrated above, the amount of utterances changed during problem solving for each pair depending on the difficulty level of the problem and their time management skills, suggesting that it impacted the positive effect of working in pairs.

Learner Awareness for the Pair Test

Judging from the results of the survey conducted after the pair test, a relationship between the effectiveness of pairs and a trend toward awareness of the pair test was considered. In 2008, the survey included 10 items in 2008, whereas it comprised 11 items in 2009.

Table 3 Survey Items with Significant Differences from Pair Results

Survey Item	Pair Result	n	m	ρ	Judgement
Easier to solve as a pair than individually	H	174	2.41	0.0001	**
	L	86	1.99		
Consulted during the pair test	H	174	2.54	0.0017	**
	L	86	2.25		
A free conversation time before the pair test is necessary	H	98	2.33	0.0028	**
	L	42	2.66		
There was sufficient time for the pair test	H	76	0.28	0.0053	**
	L	44	0.07		
Communication during the pair test was usef	H	174	2.69	0.0174	*
	L	86	2.52		

Analysis of the significant difference between Group H, which was highly effective in terms of the pair learning effect, and Group L, which was less effective, was conducted with respect to these questionnaire items. The results of the common items from 2008 and 2009 were totaled together.

First, Table 3 shows the items that pointed the significant differences. These results infer a willingness to solve problems cooperatively and communicate with each other, and whether or not they had sufficient time determined how effective pair learning was. As such, a positive attitude and increasing participation awareness of cooperative problem solving, expanding the ability to communicate, and improving time management skills are essential to promoting effective pairs.

We can interpret from the survey items (Table 4) where there was no significant difference between confidence in the class and students' interest toward computers, and these items are unrelated to the effect. Free conversation time beforehand, the pair testing evaluation, and students' interactions that were high across the board, are useful suggestions for setting up pair approach classes.

Table 4 Survey Items with No Significant Difference with Pair Results

Survey Item	Pair Result	n	m	ρ	Judgement
Pair works were easy to understand	H	76	1.47	0.3193	
	L	44	1.41		
Free conversation time was sufficient	H	98	2.72	0.2808	
	L	42	2.66		
Pair work approach works well	H	98	2.65	0.2677	
	L	42	2.60		
Interest in computers	H	76	1.82	0.2673	
	L	44	1.72		
Friendly interaction with partner	H	98	2.50	0.2096	
	L	42	2.60		

Conclusion

The results from the two-year experimental classes with pair testing provided the following findings within computer literacy education at university.

1) Pair problem solving was higher than individual problem solving and it confirmed that pair task achievement was higher overall. On the other hand, from an individual perspective, working in pairs was ineffective or less effective for nearly 40% students.
2) The study inferred that the combination of criteria such as mixed-gender pairs with similar academic ability and differing computer experience was highly effective.
3) The study discovered characteristics such as a greater discrepancy in the amount of utterances for certain pairs and remarkable increase in utterances for questions involving functions with more process steps or functions that were used less frequently in class.
4) Amount of utterances changed depending on the difficulty level of the problem or their time management skills, indicating an impact on the effect of working in pairs.
5) The study suggested that it is possible to improve pair learning results by improving students' participation awareness and positive attitude toward cooperative learning, as well as improving their ability to communicate and time management skills.

Further detailed analysis of the issues related to the pair learning approach will be conducted to resolve factors that affect the positive effect of pair learning. In addition, this study captured the pair learning effect through short-term experimental classes and consideration of further long-term application is necessary.

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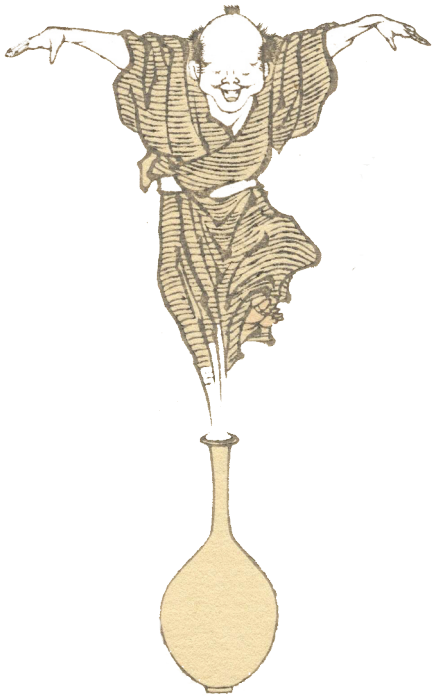

Reflections on the Final Year Learning Experience –Designing a Capstone Experience

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Kin Chi Wong

Yi Ching Li

Ching Yan Hung

Abstract

Cross-sector educational reform to be implemented in 2012 in Hong Kong (HK) is intended principally to prepare students for the future workplace. One of the explicit requirements for the new four-year undergraduate curriculum is the inclusion of a capstone course for final year students. This paper explores the uptake and reported effect of the capstone- liked final year project using participating students' experience (voice) in existing undergraduate study programmes in the Chinese University of Hong Kong (CUHK). Semi-structured interviews were used to collect student feedback; findings revealed considerations in terms of the core design elements highlighted in literature. The paper highlights students' lack of readiness to successful transition into the workplace, linked to the current academic focus of projects. A framework that includes learning activities preferred by students is proposed for the final year learning experience. Findings from this study will be useful for curriculum development and evaluation of the final-year curriculum.

Keywords: cross-sector educational reform, future workplace, capstone course

Introduction

Hong Kong's 3+3+4 education reform that introduced cross-*sectorchanges* to both the secondary and undergraduate (Ug) systems, has several important goals. These include increased exposure to non-academic learning experiences; expanding whole person capacity; supporting a close linkage to workplace; increasing students' adaptability given rapid changes in society; and preparing students for a knowledge-based society (Education Commission, 2000). This reform, commenced in 2009 at the secondary school level, will extend in 2012 into the tertiary sector with universities introducing a normative 4-year undergraduate curriculum. One of the explicit requirements for this new curriculum is the inclusion of a capstone course for final year students. These dramatic changes in an academic structure require a careful look at the current curriculum, especially on students' final year, when students can expect to leave a relatively safe and comfortable environment and move into the workplace. In this new environment, as The Higher Education Academy (2006) noted in relation to learning and employability, performance in disciplinary subjects is not a crucial factor, rather it is capacity and achievement in a range of soft skills (such as interpersonal skills, communication skills, and presentation skills etc.) that will most impress potential employers.

This paper reviews the final year project (FYP), the de-facto capstone- type course in a local Hong Kong university. The aim, using the students' voice, is to understand if the FYP implemented as a capstone in the new curriculum will support the development of desired attributes necessary to support graduate employability. Consistent with an outcome-based approach to education, the focus should be on authentic learning opportunities in the final year in order that students may exercise and enhance their soft skills before stepping into future careers. In other words, higher education institutions should not simply produce discipline-based outstanding graduates, but a multi-faceted graduate able to meet the needs of the society.

Education reform in HK

According to the Reform proposals for the Education System in Hong Kong (Education Commission, 2000), Hong Kong education reform started in late 1990s with the goal of promoting lifelong learning and all-round student development. Consistent with, a public consultation process it was initiated to determine the objectives for education in the 21st Century for Hong Kong. The results showed that higher education should facilitate students' learning, develop their abilities in effective communication and expand their capacity for creativity and sense of commitment to their communities. Moreover, in any fast-changing society, the requirement of multi-faceted talents was favored over specialized talents. Reflecting these concerns, a report by University Grants Committee (UGC) a non-governmental body that advises the Government of Hong Kong on the development and funding needs of higher education institutions (HEI), noted institutions should provide students with interdisciplinary learning experiences that can equip them with an expanded scope of knowledge and foresight for a globalised society (UGC, 2010). The subsequent comprehensive cross-sector educational reform process initiated in 2009 in secondary schools and extending in 2012 to the Ug sector echoes these broad objectives for higher education.

New Ug curriculum and the capstone course

The Chinese University of Hong Kong (CUHK), where this study is situated, is one of the premier research-intensive institutions in Asia. As advocated by the UGC, an outcomes based approach has been integrated into the design of the new curriculum. Another feature of the new curriculum is a common Faculty Package for first-year students, with core components of the curriculum strengthened by the inclusion of General Education, languages, information technology and physical education units. Another feature of the four-year curriculum, consistent also with the objectives of the education reform, is the systematic inclusion of a

capstone course as the culmination of the undergraduate experience (CUHK, 2011). Different capstone experiences are being designed to suit the nature of each discipline, however, as the new four- year curriculum states, the capstone course targets the synthesis of subject knowledge, as well as independent enquiry (e.g. research) or execution (e.g. creative design in Fine Arts or Architecture, engineering design, fieldwork or internship both involving reflection and evaluation) (CUHK, 2011).

As the University has noted, previous experience and pilot courses with Final Year Projects have demonstrated benefit in terms of the development of student capabilities. At present, CUHK has eight faculties offering 62 undergraduate programmes; of these some twenty- four programmes have a compulsory FYP as a graduation requirement and thirty-eight programmes offer a FYP in the form of an elective. As a note of caution, however, it is worth noting that the majority of FYPs are operated as academic research.

The Capstone Experience. In general a capstone course is intended to integrate a body of relatively fragmented knowledge into a unified whole (Atchison, 1993; Durel, 1993). This integrating activity, allows students the opportunity to look back or reflect over their undergraduate curriculum in an effort to make sense of that experience. It should also allow students to *look forward* in order to transition into working life by building on that experience (Durel, 1993; Henscheid, 2008).

The issue of looking forward is crucial given the realization in the 1970s and 1980s of a gap between academic study and the real world (workplace). As a consequence, some universities moved to develop a course that could bridge this gap (Schroetter & Wendler, 2008). The resultant course(s) evolved into what is referred to today as a capstone course and that

some describe as the "crowning achievement" in an undergraduate programme (Atchison, 1993, cited in Schroetter & Wendler, 2008). The National Survey of Senior Seminars and Capstone, a study in the United States, recorded the importance, even critical nature of this course (Chickering and Schlossberg, 1998; Henscheid & Barnicoat, 2001). As this study also noted, it is often difficult for students to leave their comfort zones and move into a new environment, and educators need to make an effort to help students move on after graduation.

Chickering and Schlossberg (1998) reported three issues for educators assisting students to successful transition: first, make a career connection, second, help them identify their new roles after university; and third, create a life-long perspective. Educators should treat this facilitative role as equally important as helping student transition into university as freshmen. Progressive design features of a transition-focused capstone include a foundation component, needed to provide student basic knowledge and skills. These foundations are provided by the formative courses students complete in the first three years of university study. A second component is what can be termed as a pre-capstone component completed towards the end of year 3 and the beginning of year 4, the capstone year. This component is intended to help student learn advanced research techniques and like skills in preparation for their final year study. The final component is the actual capstone course, that some also describe as an 'experience' in recognition that the capstone objectives are likely to be satisfied better by a composite range of activities (Hauhart & Grahe, 2010). Reflecting upon the diverse needs of the student body and the transition needs, as one institution (Copenhaver, 2011) has determined, the capstone experience is made up of a varied set of options so that students are able to choose their personal capstone experience according to their abilities and future needs.

Design Characteristics. Literature identifies two broad types of capstone, a developmental capstone and an assessment capstone. In this paper, the focus of the capstone course is developmental, because this form of capstone tends to be the common approach in higher education. Reflecting on this focus, there are four broad design characteristic of a capstone activity or course. These are:

- To encourage *integration* and synthesis of previously acquired knowledge and skills (Bailey, Oliver & Townsend, 2007; Cuseo, 1998; Jervis & Hartley, 2005). Other researchers state the integrative focus as students being given a chance to make connections between course content, acquired skills and application in a wider context (Holdworth, Watty & Davies, 2009; Huber & Hutchings, 2004; Rowles, Koch, Hundley, & Hamilton, 2004).
- To facilitate some form of *transition*, such as from university to professional/working life (Bailey et al., 2007; Cuseo, 1998; Henscheid, 2000; Schroetter & Wendler, 2008; Wood, 2007). This characteristic includes the encouragement of useful connections between study majors and work experiences, such as those acquired via internships and exchanges; an awareness of personal development necessary to transition from undergraduate to post university life; and preparation for career or postgraduate education through professional development (Henscheid, 2000; Jervis & Hartley, 2005). Importantly, as Rosenberry & Vicker (2006) noted, when capstone activities address career issues, students are reported to have a better understanding of the relevance of what they have learnt and how it can be applied.
- To assist students to *reflect* on and demonstrate on what they have learnt over their undergraduate studies (Holdsworth et al., 2009; Kerka, 2001). Reflective practice is a fundamental skill of life-long learners and being able to reflect on one's performance can also help achieve higher goals. Hence, reflection is a vital component of the capstone experience (Kift, Field & Wells, 2008) that involves both course content in their academic major and more generally across courses, as well as an inner, personal reflection by students on their aims,

personal strengths and future plans (Brooks, Benton- Kupper & Slayton, 2004; Henscheid, 2008).

• Finally, being placed in the final year of an undergraduate degree, a capstone activity represents a culminating experience (Holdsworth et al., 2009) that arguably offers students a chance for *closure* (Rowles et al, 2004; Schrotter & Wendler, 2008; Schubert, 2009). This is the last opportunity to ensure students graduate with the knowledge, skills and attitudes they need to meet the growing demands of professional practice (Rowles et al., 2004). The process of closure, which includes recognition of accomplishments, pulls together all the ideas presented in different units and helps construct some sorts of integrated, meaningful whole experience (Heinemann, 1997).

Figure 1 below illustrates a developmental capstone designed to support generic skills and high-level thinking applicable in the workplace. The central learning outcome of this course therefore is encapsulated by graduate competence. The focus for students is not about acquiring new knowledge, but about integrating, reflecting and extending knowledge that has already been acquired (Bailey et al, 2007; Cuseo, 1998).

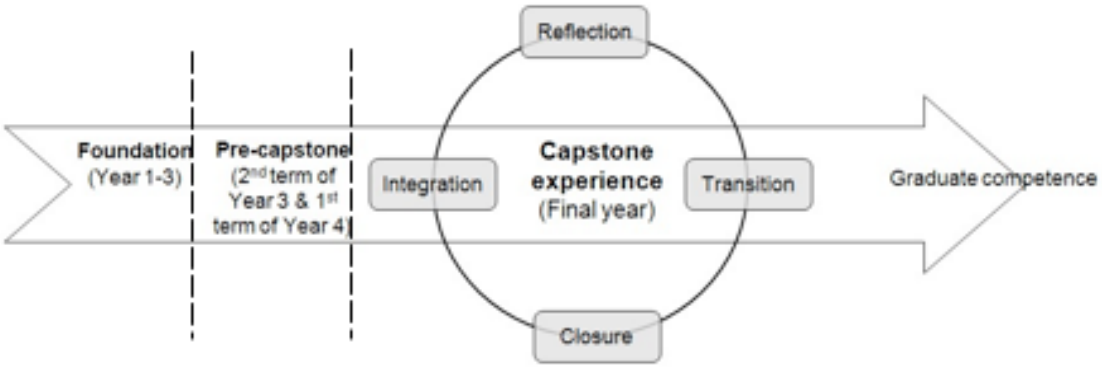

Fig. 1 A conceptual illustration of a developmental capstone

Methodology

The final year project (FYP), a de-facto capstone in the current three-year curriculum was examined in order to understand the difference, if any, between current practice and the ideal capstone design experience. The FYP is significant to a student's final year because, for some disciplines, it was a compulsory course and students were expected to devote most of their time to complete this project as it is regarded as an important milestone in their undergraduate studies.

This investigation adopted a qualitative approach, because it provides a rich pathway to collect insights and practices through interviews and personal conversations (Brewerton & Millward, 2006; Heppner & Heppner, 2004). As suggested by Brewerton and Millward (2006), a qualitative approach using semi-structured interviews allowed interviewees to offer their own experiences in a fluid and unrestricted manner, still within the context of the target research area. The research framework proposed for this study is based on the earlier defined four design characteristics for a capstone experience, and a survey done with 300+ graduates.

Eighteen students from thirteen programmes across the Science, Engineering and Humanities disciplines participated in interviews on a voluntary basis. During the interview, students were asked if the FYP helped them in developing their future and whether the FYP completed met the four capstone characteristics evidenced in literature. Participants were also encouraged to articulate their expectations and opinions on a capstone experience. Interviews were recorded and then analyzed using thematic analysis, with significant comments and expectations among students sorted by supporting argument.

Reported findings

Relative importance of the design characteristics

Based on accumulated responses, all participants agreed that the four characteristics are essential to the final year of study. However, among the four characteristics, transition received most attention. Students said it is important to help them understand the workplace environment, provide chances to put theories into practice, and better determine a career path. At the final stage of undergraduate life, students suggested that knowing specific workplace requirements and preparing to face unexpected real life challenges were the important reasons for a "transition" component in the final year. Students also acknowledged knowing the real world practice as necessary in order for a smooth transition. For example, a Science student, who spends 16 hours a day in the library to study, expected he would face many problems in effective communication when he applies for jobs. According to him, if he had been given a chance to know the workplace environment and the relationship between Science and the outside world, then this would have been most helpful to his future employment.

Another factor highlighted by students as supporting better transition, was the chance to execute and apply what they have learnt in class in their final year. Application of integrated knowledge serves as an experience for students to evaluate their performance and abilities to manage hands-on tasks. As several students mentioned:

- '[the opportunity to] u*se acquired theories to apply into the real world, after such practical use of theories, I will never forget these theories, because they transformed into my experience'* (Humanities student).
- *'Something you may only have came across in one course, then forget, but by doing FYP you recall your memory and apply it.'* '*Because you can apply what you have learnt [in*

final year] and after graduation, you can perform better transition to the real world, you won't get lost after graduation' (Science student).

It is clear that application of knowledge is important to students and for this reason, authentic assessment is also a crucial element of the study experience. Authentic assessment involves worthy intellectual challenges, presented as an array of tasks that are likely to be encountered in the workplace (problem identification, research, analysis, problem resolution and presentation) which requires full application of acquired knowledge in realistic settings. To illustrate, a written test, for example, is not a useful basis to infer driving ability. An authentic test would include some demonstration of ability, as well as an opportunity to improve performance. In all, students endorsed the importance of a final year learning experience based on the four design characteristics, with a particular emphasis on transition. However it is problematic to discover whether students found their FYP experience actually satisfied by these four characteristics.

Evaluation of the FYP

Table 1: Summary of student voice by development theme	
1.Curriculum design	
Integration (+ve)	My discipline emphasizes fieldwork a lot in any course-based projects →can integrate the skills of fieldwork methodology. Have to use previous knowledge in order to produce something new → can also apply what I have learnt in my minor FYP reminds me of what I have learnt in year 1 →apply them in the project.
Integration (-ve)	FYP cannot integrate previous knowledge. Many necessary materials are new FYP topic is not related to year 1 & 2 courses. New theories →feel like taking an extra course rather than consolidating previous knowledge
2. Focus of the FYP	
Transition (+ve)	Cannot prepare me for workplace, but postgraduate study Compulsory placement demonstrates my competence

Transitio n (- ve)	Not useful →not planning to stay in the academic world. Wonder how an academic thesis is considered to be helpful in a business world. FYP no use for job application→just a 6-credit course Research type FYP cannot help job application Cannot support my transition to workplace, it is too concentrated →cannot learn anything from other fields. Won't stay in the same field →FYP is unhelpful
3. The graduate capabilities	
Reflectio n and Closure (+ve)	Know how to conduct a study effectively and efficiently. Learnt different theories and became more capable. Presentation skills become better because of there are chances to practice throughout the FYP.

Of the four design characteristics identified in literature, two characteristics, reflection and closure, were reported as being commonly evident in the FYP. However, integration and transition were not commonly reported. Examining the student feedback, themes related to *integration* are categorized under curriculum design, while comments related to *transition* aspects are categorized in terms of the focus of capstone. Comments linked to *reflection* and *closure* is grouped within the broad theme of developing graduate capabilities. The following discussion on student voice is in terms of these three categories (Table 1 is a summary of key points noted by participants).

Curriculum design. Curriculum design is crucial to a successful implementation of a capstone experience. The study before the final year, i.e. the foundation and pre-capstone, is also critical for preparing the student to reflect and integrate during their final year study. According to the student voice, there are both positive and negative feedback on the FYP. Most positive feedback was gained from the closure and reflection aspects. Student reported that they could reflect on their performance in soft-skills and personal goals through FYP.

- '*I know how to conduct a study effectively and efficiently*' (Humanities student).

A science student said because her FYP is to create a new product, so she needed to use her previous knowledge to serve as the base of reference:

- '*I have to use previous knowledge in my FYP, in order to produce something new [a newflavor candy]. I can also apply what I have learnt in my minor [marketing studies], as I have to conduct marketing research for my new product*' (Student from Science).
- '*FYP reminds me of what I have learnt in year 1, for example some formula, and I manage to apply them in the project*' (Student from Engineering).

However, this experience was not a common one among other students. More commonly, students reported that only a limited amount of knowledge was useful to their FYP. These students, therefore, thought that the FYP did not help them to integrate what they have learnt in their University life.

- '*This topic is from a year 3 course [final year course], not quite related to year 1 & 2 courses*' (Science student).
- '*I don't' think FYP can integrate previous knowledge, in these 3 years, only one course talks about cultural conservation. Many necessary materials are not being mentioned in previous years; they are new to me and I have to find them by myself*' (Humanities student).
- '*Many of them are new theories; it seems like taking an extra course rather than consolidating previous knowledge*' (Engineering student).

Notwithstanding the fact that students in the FYP could not consolidate what was otherwise informative knowledge, students found that research skills learned in previous years were essential to their FYP. As one humanities student noted:

- '*My discipline emphasizes fieldwork a lot in course-based projects, so in my FYP, I can integrate the skills of fieldwork methodology*.'

Based on this feedback, it is reasonable to infer that curriculum design and learning activity are important when implementing a capstone. To illustrate, without an adequate foundation a

capstone experience would become meaningless. Similarly, without authentic assessment, a course or project would not help consolidate desired capabilities and confirm the ability to successfully apply acquired knowledge in realistic settings, as well as afford some opportunity to improve performance.

Focus of the FYP. The focus of the FYP affects the reported learning outcomes of students. Based on student feedback, the current approach to FYPs appears to be academic in –focus and as such students found the experience unable to cater to their needs and abilities. Conversely, students who were interested in postgraduate studies reported the FYP as most beneficial to their transition.

- '*I have learnt different theories, more algorithms and* [am] *more capable of doing [computer] programming'* (Science student).
- '[the] *FYP cannot prepare me for [the] workplace, but it prepares me for postgraduate study. For example, I know how to do research and [have] discover[ed] that being a MPhil student is to do research consistently, then write a thesis'* (Science student).

These students stated that the FYP helped them understand the process of academic study. In this case, the FYP gave final year students a sense of closure and offered them a chance to reflect on what they have learned during their university life. When asked about whether the FYP helped them integrate previous knowledge and skills, most students mentioned integration in terms of research skills, but not the consolidation of knowledge and skills. One issue with integration was that students noted the courses offered in the previous years were too diverse. Another issue was, given that the FYP was focused on academic research and so narrowed down to a specific topic, the approach allowed very limited inferences from previous studies.

The sum effect is that the focus of the FYP is academic research and as a result viewed as offering limited opportunity for programme-level knowledge integration. Moreover, with this

academic focus, the FYP also offers little opportunity for the development of soft skills, such as independent problem solving, self-management, communication and teamwork. These and other workplace capabilities, including technological awareness and initiative and enterprise are important graduate capabilities (Kember & Leung, 2005). However, while students questioned the usefulness of an academic paper and a research-focus in a competitive business world, not surprisingly given its academic-focus, the FYP was seen as useful for transition into graduate school and postgraduate studies, but not as a transition into the workforce. Some representative comments on the utility of the FYP in terms of student's expectation in the final year study include:

- '*After doing this FYP, I realize I don't want to stay in the academic field*' (Humanities student).
- '*I wonder how an academic thesis is considered to be helpful in a business world'(*Humanities *s*tudent).
- '*FYP is not useful to me, because I am not staying in the academic world' (*Humanities student).
- '*My FYP cannot support my transition to workplace, it is too concentrated and I cannot learn anything from other fields.'* (Science student)
- '*FYP is unhelpful in my transition, because I think I probably won't stay in the same field anymore'* (Engineering student).

Highlighting the limited practical utility of their FYP, students reported their experience as supporting successful job application, but not workplace transition. As one student noted:

- '*I expect my degree is to be used for job application, but my research type FYP cannot assist transition [into the workplace]. If my FYP was to develop a software application [for smart phone], I think it would help my transition'* (Engineering student).

Although the majority of students viewed their FYP as unsuitable in terms of transition characteristics, some students acknowledged a transition component to their FYP because it is not purely academic research work.

- *'The compulsory placement at a primary school [allowed me the opportunity to] demonstrate my competence as a social worker'* (Humanities student).

The above findings reveal a tendency for a rigid approach to the FYP; the issue calls for better curriculum design where the experience supports students' workplace-based competence. The responses also provide support for the design approach by UCLA that allows for varied study options, based on capabilities and interests – a student-oriented capstone activity.

Developing graduate capabilities. The core objective of a capstone activity is in essence to equip students with graduate capabilities suitable for their future development. Reflecting on the broad impact of the four design characteristics, students commonly reported presentation skills as having improved because presentation is a compulsory aspects of most FYPs.

- *'I think my presentation skills [have] become better because there are some chances to practice throughout the FYP'* (Engineering student).
- *'You won't write on your job application form claiming that you have completed a FYP, unless the organization you are applying for is also concerned about your FYP topic, if not FYP is just a 6-credit course without further implication'* (Humanities student).

While students reported their presentation skills were improved as a result of the compulsory assessment requirement, in general students doubted the significance of completing the FYP as a way to demonstrate their abilities to the prospective employers. One aspect that appears less appreciated is the development of written communications; perhaps a capability that does not appear as immediately relevant, but this is still a key graduate capability (Kember & Leung, 2005). Overall, Table 1 is a summary of developmental themes as raised by student voice. As

the table shows, integration and transition are reported variable, depending on the focus of the FYP, academic or workplace transition. There is in contrast a general appreciation of the development of graduate capabilities, most notably presentation skills and the capacity to conduct an investigative study.

Summary of analysis

The findings suggest that the current approach to the FYP appears to address two design characteristics, closure and reflection, quite adequately. However, the FYP does not appear to address integration and transition. Based on the data, all final year students identify the four characteristics as necessary in a capstone experience, but all students emphasized transition as most important. In contrast to the emphasis on transition, the overt focus of the FYP is not academic, with most departments requiring a thesis or a research-like project that allows for a varied approach, nor does it relate to workplace matters. Students concerned about seeking work upon graduation, do not value the undoubted development of research skills and discipline knowledge from the FYP. What students appear to want most are chances to apply their knowledge and improve their soft skills. The desired type of activities could be broadly described as needing to be authentic and practical in nature. However, for some students, those aiming for further studies, the FYP helps realize the general goal of undertaking real academic research. However, this group was a minority in the final year student body and the FYP as currently conceived can only be seen as a limited capstone experience, and one without the four design characteristics.

From the findings, it appears that curriculum design affects successful integration of knowledge. Some students thought that their previous studies were practical enough and sufficient to help them through the process of the FYP, while others thought the curriculum was

not coherent enough and that they were unable to apply what they have learnt in the previous years. However, the academic focus of a FYP facilitated a smooth transition for the postgraduate students. Table 2 below outlines a design framework that identifies development aspects, learning activities and assessment strategies for a capstone experience.

Table 2: Design framework to support a capstone activity

Integration (I)**	**Reflection (R)**	**Closure (C)**	**Transition (T)**			
Integrate knowledge and skills	Reflect on development - academically, socially and personally.	Close undergraduate student life	Transition from undergraduate studies to being self-autonomous learners.			
Choose the activities and assessment						
What are we developing/ or assessing (Indicative)	**How (Authentic learning activities) (Indicative)**	**Authentic assessment methods (Indicative)**	**Design Characteristics**			
			(I)	**(R)**	**(C)**	**(T)**
University community	Project work, service	Group project, self reflection	✓	✓	✓	✓
Discipline knowledge	Project work, group presentation, simulation, thesis	Presentation, peer assessment, group projects, reflections	✓	✓	✓	✓
Academic skills, self-directed learning e.g. research, collaboration	Group presentation/case analysis/ Simulation/ Lab experiment report	Presentation, participation, peer assessment	✓	✓		✓
Self awareness	Reflection journal / Blog	Reflection; Pass/Fail	✓	✓		
Leadership skills/ Teamwork/ Interpersonal skills	Group project, team-based activities, Career planning	Group project, peer assessment, reflection, presentation	✓	✓	✓	✓
Problem-solving skills	Case analysis/ Group/ Research project/ Simulation	Group project, peer assessment, reflection	✓	✓		
Citizenship	Service learning	Not assessed			✓	✓

The suggested learning activities in Table 2 are similar to the preferred learning activities extracted from the findings of the student voice. The most welcomed learning activities were group work, presentations and fieldwork. These activities were important in the development of interpersonal skills, communication skills, presentation skills and the practical skills that nearly all employers are looking for. For the majority aiming to start a career right on graduation, an internship to gain a

real working experience is most valued. Generally, these students also wanted a smaller class size, as this enabled richer classroom interactions. Alternatively, students who planned to pursue further studies wanted more seminars and more teaching assistants available to offer them support and study assistance during their final year.

Conclusion

If higher education is aiming at producing multifaceted graduates who are both confident and competent in the future workplace, it seems that the current final year project (FYP) is not adequate in preparing the way. This study reveals the research-oriented FYP is the sole option for final year students and this activity is limited, failing to provide an integrated experience that is able to satisfy the expectations of the majority concerned with finding employment. The current FYP is, based on student feedback, only able to meet the needs for research students by facilitating their transition into graduate study. The capstone design framework illustrate stages that can help programme designers match student capabilities and learning experience to better assist knowledge integration and successful transition. Students with higher academic capabilities may be interested in and capable of handling a demanding research thesis. This would most likely suit those students more interested in staying in the academic field and continuing to graduate school. For students less interested in academic studies, the opportunity to choose projects, internships or group-based projects will help them attain better transition.

In summary, this study illustrates the idea that students should not be limited to knowing things, but should also be given a chance to reflect on knowledge and to apply what they have learnt in their studies for their future workplace. The capstone design dimension of transition captures this concept. The limitation of this research is that it was conducted only in CUHK; the study may however reveal what is happening in a wider education sector. The essentiality of the four components in a capstone experience conveys an important message the student voice appears to be saying: that integration and transition aspects are not being emphasized under the current 3-year curriculum. In other words, students are stuck within the academic world, and the chances to widen their horizons are thus being limited. For the 4-year curriculum, careful consideration should be taken in design of the new curriculum that culminates theoretically with a capstone experience. There is a deep yearning to improve students' capabilities towards realizing their life-

long goals. There are also some yet unrealized pitfalls from an academics viewpoint, such as finding suitable topics, marking thesis and providing feedback. These deserve further inquiry.

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Using a Blog to Facilitate Extensive Reading: An Exploratory Study

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Abstract

Research shows that extensive reading (ER) has many benefits for language acquisition. The challenge today is making ER appealing to the digital generation. For a possible solution, it is pertinent to look to the social media embraced by today's youths. This study was conducted to explore the use of the blog as a space for sharing peer-selected reading material to enhance reading motivation among English Language learners. The research questions that guided this study are whether the blog is a viable tool to facilitate ER, and how students perceive the use of this Web 2.0 tool for ER. The sample comprised two groups of students in a private university in Malaysia: 12 undergraduate students in a remedial language class and 18 students enrolled in an English for Specific Purposes (ESP) course. A blog was set up for each group of participants to post reading materials of their choice for blog members to read over a period of 8 weeks. A questionnaire was administered at the end of the study together with focus group interviews. The qualitative approach enabled insights into process and attitudes. The results showed that the students were positive about the use of the blog for reading beyond the classroom but required tangible rewards and complementary activities to reinforce their motivation to participate. Most significantly, the results of this study indicate that the blog is a viable tool for facilitating ER.

Keywords: Blog, Extensive Reading (ER), Web 2.0

Introduction

Few language teachers today would argue about the benefits that Extensive Reading (ER) can have for the language learner. Research over the past decade underscores the usefulness and effectiveness of this reading strategy which is also referred to as 'pleasure reading' (Mikulecky, 1990 cited in Day and Bamford, 1997), and which Krashen describes as 'self-selected voluntary reading' and 'recreational reading' (2006, p.2-3). Extensive reading has been found to improve reading skills, vocabulary, spelling and writing (Krashen, 1993). In addition, ER strengthens the student's motivation to read more (Hayashi, 1999).

With such an impressive 'resume', ER should be employed in every English Language programme. Yet, the reality is that it is not. The reluctance of teachers to implement an ER programme in their classrooms has been attributed to a host of deterrent factors amongst which are cost, time constraints, and the work required to set up such a programme (Day & Bamford, 1998:46). A decade later, problems still exist. Macalister's (2010) study on the attitudes of teachers of University preparation courses in New Zealand towards ER revealed that time constraints within teaching programmes and uncertainty about university students' view of the relevance of a reading programme discouraged them from implementing ER in their institution. Another study on Taiwanese language educators highlighted logistical issues concerning the management of the process of ER (Sun, 2003). The online reading programme designed by Yu-Chih Sun (2003) to overcome the perceived problems of implementing ER among EFL learners is based on a structured system that fulfills the requirements for ER. However, it was reported that the rigid system had problems such as workload issues, inflexibility and students' aversion for writing reflection.

We posit that the implementation and effectiveness of an ER programme is not only hampered by logistical issues but also by the learners' attitudes. It is an established fact that the young people sitting in the classrooms today have grown up with technology and are called by many names including digital natives (Prensky, 2001), Millennial students (Elam, Straatton & Gibson, 2007 in Lomicka & Lord, 2009) and the Net Generation (Tapscott, 1998, 2009). This group is profiled by Prensky (2001) as needing information fast, preferring random access and thriving when networked. These learners' preference for an experiential, interactive and image-rich environment (Tapscott, 1998) also indicates a gap between their text consumption habit outside the classroom and the traditional textual experiences in the classroom. Educators have to respond appropriately to the fact that the typical teenager today encounters texts that bear little resemblance to the book on a daily basis (Bigum & Lankshear, 1997, Healy, 2000, in Green & Campbell, 2003). To increase the potential of success of the ER programme, it is only logical to look to digital technology and media this generation is comfortable with for an alternative platform to the traditional approach.

This study examined the use of the blog to facilitate an ER programme and is based on the rationale that the characteristics of this Web 2.0 tool can support the principles of this reading programme while avoiding some of the inhibitive problems.

Characteristics of the Weblog

The Weblog or blog is a second-generation asynchronous Internet tool that is defined as an online hypertext journal that others read and react to (Blake, 2008). Its primary purpose is to provide a space for the blogger to share writings with the online community who then respond in writing. The interface is easy to negotiate and allows pictures as well as audio and video clips to be included. The postings are displayed in

chronological order and automatically archived so that a visitor can search for and read earlier entries (Sharma & Barrett, 2007). Its versatility is underscored by Bhattacharya and Chauhan (2010) who describe this popular Internet communication tool as a 'dynamic place that is connected by time and topic and a frequently posted list of interesting websites, or a personal diary of events and thoughts, or a combination'. Their research on learner autonomy through blogging yielded positive results.

The blog is not a new technological platform but Lomicka and Lord (2009) rightly point out that Web 2.0 "is really an attitude and not a technology" and is about existing technologies being harnessed to do more and different things, a notion that supports this exploration of the blog for enhancing reading rather than writing which would be closer to its original purpose. There are sufficient reasons to support the idea of using the blog as a repository for authentic target-language resources easily sourced from the Internet. Setting up a blog for a class of students to share reading materials requires minimal time and cost. The blog can be accessed anywhere using any device that allows connection to the Internet such as laptops, tablet computers and mobile phones. The collaboration made possible through an easy to access platform such as a social networking tool like the weblog could create a supportive social climate that helps motivate the learner to participate in ER.

The blog and the key elements of ER

Day and Bamford (1998, 2002) offer 10 principles for ER which deals with the characteristics of ER and the conditions and methodology needed for its success. How the blog is able to support each of these principles is explained below:

1. The reading material must be easy

The reading material would be selected by the students for the students. It is logical to assume that the chosen reading materials would be filtered and deemed accessible to the target audience. This implies that the materials posted in the blog would be comprehensible to the members.

2. A variety of reading material on a wide range of topics must be available.

The blog members would have the Internet as a resource for reading material. There is no question about the Internet being a rich resource of a vast variety of reading material. According to a Web server survey conducted by Internet Services company Netcraft in August 2011, there are more than 460 million websites in existence. Not only do these sites supply text on every topic imaginable but they also provide a wide variety of text types including comics, jokes and video clips which are the staple fare of the visual-hungry digital natives (Prensky, 2001).

3. Learners choose what they want to read.

The blog would serve as a repository of reading materials deemed interesting and suitable for reading by the learners themselves. The process requires participants to first choose from what they enjoyed reading to share on the blog, and then to select from the shared materials what they want to read. Freedom of choice is exercised at two points of the process. Not only would they choose what they want to read but they would also recommend what they enjoy reading to their friends. Hence, the materials are peer-selected and self-selected.

4. Learners read as much as possible.

The task of sharing reading material on the blog would ensure that students read for two purposes. First, the students have to search for reading material to share. In other words, they have to read the material to determine its suitability for sharing. Next, they are instructed to read what other members have posted which provides for more reading. This time, it is a more 'conscious' reading exercise.

5. The purpose of reading is usually related to pleasure, information, and general understanding.

The Internet allows for easy access to a wide variety of reading materials. With the freedom of choice that the participants are given, they would naturally look for what interests them and gives them pleasure.

6. Reading is its own reward.

The blog is for students to read and share what they read so that they can read even more. There are no structured activities or comprehension and language exercises to interfere with the reading activity itself. It is believed that learners will derive both pleasure and language benefits from reading the blog posts.

7. Reading speed is usually faster rather than slower.

If the reading material is interesting and easy to understand, the reader will read faster. Again, this is made possible by virtue of the resource being the Internet and the 'chooser' being a peer who likely has similar interests and language ability.

8. Reading is individual and silent.

Participating in this blogging activity requires the students to read outside the classroom at their own pace and leisure. When to read and how much to read is left entirely to the individual. Although the students are instructed to post at least once a week and to read at least half of what is posted as a guide, they are under no duress as there is no strict monitoring or accounting involved.

9. Teachers orient and guide their students

This study focused on the use of a Web 2.0 tool in ER and sought to examine its efficacy in motivating students to read. Orientation and guidance were provided at the initial stage of the experiment. Thereafter, the instructor kept in the background, surfacing when necessary to give verbal encouragement to the class to continue participating.

10. The teacher as a role model of a reader.

For ER to be effective, the teacher is expected to blaze the trail for the students. With a reading blog, the instructor can easily access what the students are reading and read what they read. The students will see the instructor's comments on the posts which can be an incentive to them to read as well.

Theoretically, the blog could help eliminate the deterrent factors that make language practitioners shy away from ER. It is then necessary to examine it from the practical perspective. Is the blog viable as a platform for an ER programme? Can it support the characteristics of ER?

The other dimension that needs to be assessed in relation to the practicability of using this online social network tool is the users' perception and attitude. The learners' receptiveness towards using what they regard as a social medium for academic purposes is important to the successful implementation of the programme.

Methodology

This study explored the use of the blog as a space for language learners to share reading materials for the purpose of Extensive Reading. The primary focus of the study is to examine the viability of the blog in facilitating ER and to gain insights into the perception of the participants towards the use of this social network platform for ER. This paper employs the qualitative approach with a detailed explanation of the findings from the questionnaire administered and the focus group interviews conducted.

The Participants

The study involved two groups of students at a private university in Malaysia. The groups were taught by one of the researchers in two separate semesters. Twelve students in a remedial English language programme made up the first group. They were a multinational group made up of students from Malaysia, Indonesia, Myanmar and China, with Indonesians having the largest representation (7). These first year degree students majoring in information technology and computer science were enrolled in the language programme to raise their proficiency from pre-intermediate to intermediate level. The programme was an intensive 12-hour per week course that focused on language skills. The second group consisted of 18 students in a foundation

programme. They consisted of Malaysians with those of Chinese descent making up two-thirds of the group. The students were taking Technical English, an English for Specific Purposes (ESP) course which was a core subject meant to equip them with language skills relevant to their specialism. Their English language proficiency ranged from pre-intermediate to advanced levels.

Procedure

The objective of the planned extensive reading programme was first explained to each group. The blog for the Remedial English class was created by the instructor using Blogger, a free blog-publishing platform, and given the name CPE Readers Club. The ESP group created their own blog using WordPress, another popular free blog publishing tool. The group came up with their own name for the blog – Techreaders.

The participants were instructed to post materials in their respective blogs for their course mates to read for a period of eight weeks. The guidelines for participation were also posted in both the blogs.

G U I D E L I N E S F O R M E M B E R S
You can...
...share articles, news, comics, stories, poems, jokes & riddles

You should...
...provide a brief description of what you want to share
...post something at least once a week
...read at least half of what has been posted
...comment on what you have read

You must not...
...post material with sensitive content (e.g. about politics or religion)
...post pictures without text

Figure 1: Guidelines for members of the blogs (Extracted from: http://cpe-readers.blogspot.com/)

The students were allowed to select any form of reading material to fulfill the 'freedom of choice' aspect of ER. Evidence that they had read a post was derived from their comments. They were allowed to respond very briefly to avoid deterring them from reading. If they were required to write at length, it could be perceived as too much work which was the case with the Taiwanese students using the ERO system (Sun, 2003).

The wide variety of Web content that is easily accessible also necessitated defining perimeters for this activity. Hence, there was the reminder to avoid materials of a sensitive or offensive nature such as politics and religion.

The lecturer planned to stay invisible and remain a passive observer throughout the eight weeks, only giving verbal reminders to the class to keep posting and reading. This was to minimize the influence of external factors and maintain the study's focus on the use of the social media platform.

Feedback and Evaluation

A post-study questionnaire focused on gaining information on the students' participation (frequency in posting and reading), the procedure involved (how they looked for reading material and how easy or hard it was), their feelings about the activity of posting and reading, and their opinion of the blog (whether it needed improvement, how to motivate students to participate and its usefulness, effectiveness and relevance to language learning).

Seven students who formed the focus group were also interviewed. The focus of the interview was for a more in-depth examination of the students' understanding of ER and its benefits, their views of reading on the Net, the collaboration aspect of the reading blog, and their level of involvement. The students were also asked to voice their opinions of the blog. These seven represent the spectrum of participants – from the active participants to the observer.

Findings

The viability of the blog for facilitating ER

The results of this experiment are presented from the viewpoint of how they support the ten ER principles (Day & Bamford, 1998, 2002). The approach adopted in this study required the reading material to be selected by the students for the students. The participants reported that they evaluated what they read for suitability in terms of level of difficulty and appeal before sharing it. A focus group member described the process involved in selecting reading materials succinctly: "Two steps – browsing and coming across something worth sharing, ask 'Is it appropriate to share?' Yes? Then post." This implies that the materials deposited in the blog were comprehensible to the members and therefore supports the principle that reading material has to be easy.

The participants who reported that it was easy to look for reading material comprised 46 per cent. Of these, half said it was because of the Internet which makes available a wide range of reading material (principle number 2). However, there were five students who found the task difficult of deciding what to share with their friends on the blog. There were also a couple of students from the Remedial class who said they

had difficulty understanding what they read on the Internet. This narrowed down their options for what to share which made this part of the programme difficult.

Freedom of choice was central to the whole experience. The participants were free to select any reading material to share within the set perimeters. They could decide whose posts to read, when, where and how to read, and also whether to respond and comment or not. In this liberated environment it was found that the main criterion used by 46 per cent of the participants to pick what to post was peer influence. Another 18 per cent specified that they looked for humorous materials that would make the others happy. They had a clear sense of the audience when they selected what would interest their friends rather than what interested them. The outcome was 86 per cent of the participants reported that they enjoyed reading the peer selected materials on the blog. Also significant is the fact that over two-thirds of the participants maintained that they enjoyed looking for materials to share with their friends. About a third of this group said they gained new information and knowledge from this exercise. This observation is also relevant to the fifth principle which relates the nature of the reading materials and the participants' interests. Clearly, pleasure, information and general understanding form the basis of the students' decision making.

The 2-stage approach which required students to first read to search and post, and then to read the shared materials increased the learners' exposure to texts. Forty per cent of the students contributed to the content in the blog at least once a week. Sixty per cent of the members read the blog at least once a week. These participants had the opportunity to read as much as possible which supports the fourth principle of ER.

The experiment yielded two significant results that relate to the principle that reading is its own reward. The first is that the participants did enjoy both the reading to search stage and reading the blog stage. However, more participants (86%) reported that they enjoyed reading their friends' posts at the blog stage than those who liked reading at the search stage (68%). The second discovery was unexpected. Although reading was perceived to be academically rewarding, a number of participants (18 per cent) felt that some form of activity such as discussion or language exercise based on the posted material would have motivated them to be more active on the blog. Even more surprising was the suggestion by 25 per cent of the participants that some prize or token be offered as an added incentive to the readers.

Fulfillment of the seventh principle can be inferred from the participants' affirmative responses about their enjoyment when reading the posts on the blog. A significant percentage (86%) reported that they enjoyed reading the shared materials.

The eighth principle states that ER has to be individual and silent. The students read at their own pace during their free time. The largest group (32%) read the blog at least once a week while the second largest group (29%) read whenever they felt like it which varied between twice a week to once in 2 weeks. They maintained that the frequency of their reading activity depended on whether the materials were interesting and whether they had free time.

The last two principles of ER emphasize the role of the instructor. In this study, the lecturer explained the objectives of ER and introduced the blog as the platform for the programme. Guidelines and rules of conduct were given and then posted on the blog as a permanent reference for the blog members thereby meeting the ninth principle.

The researcher deviated from the tenth principle which requires the teacher to be a role model of a reader for the reasons already explained in the previous section of this report. In the first part of the study which involved the Remedial Class, the instructor kept in the background throughout as planned, reading the posts but withholding comment. This was to find out whether the students were motivated by the social media platform to keep the momentum they had. It was observed that by the fourth week, that is, mid-way through the experiment, the posts became less frequent and activity slowed down. A number of the participants expressed their wish to see the lecturer involved in posting reading materials, and initiating discussion of what was posted.

With this discovery, the instructor played a more active role in the blog for the ESP class in the following semester. However, that role was limited to reading and commenting on what was read. The teacher abstained from posting reading material so as to maintain the learners' freedom of choice of reading material. This is based on the rationale that any material selected by the teacher would be obligatory reading for the students. It was found that the students preferred the teacher to be even more active. One student felt that the blog members became less motivated with time and stronger leadership would have restored interest.

Students' perception of the blog as a tool for ER

The students viewed the use of the blog for this reading programme favorably. Feedback on the effects and benefits of using this approach was obtained via the post-study questionnaire and focus group interview.

Usefulness and Effectiveness in supporting language learning

Three quarters of the participants felt that every English class should have a reading blog. They specifically said that it would help improve their reading and writing skills, vocabulary and general language. There were a few detractors (14%), however, who thought the reading blog was ineffective or uninteresting.

Effect on motivation to read

On whether the blog motivated the students not only to read more, but to read more carefully and purposefully, the focus group were unanimously affirmative on all points. All the focus group members thought that it was a more interesting way to read. One said it was fun while another explained that the collection of reading materials on the blog allowed her to encounter new kinds of reading materials that she would otherwise not read. A more comprehensive explanation was offered by one member of the focus group: "We are the Y Gen. Content flows faster on the Net and so better captures interest. I cannot see people needing books any more."

One of the reasons for the participants' liking the reading blog has to do with the design of the blog. They liked the versatility of the blog which allowed the design to be changed, the attractiveness of the design and the user-friendly interface.

Benefits from collaboration

Of the 86 per cent who enjoyed reading the posts in the blog, three quarters gave reasons that point to the social aspect of the blog. The responses of ten of the students reveal a consciousness of their relationship to the other participants. For example, two participants said they appreciated the hard work put in by their friends to find materials to share with them. Eighteen per cent of the participants endorsed the blog because it let them share their knowledge and also reading materials that interest them with their friends which is further evidence of the advantage of the collaborative aspect of this social online platform. One of the students interviewed reinforced this idea saying that the blog gave them a greater sense of community. Another student stated that the Internet is so 'huge' that it is not easy to look for specific knowledge, but with the reading blog, others did the searching and posted materials that advanced his knowledge.

Ideas for improving the reading blog

Although a decisive proportion of the students reported that they approved of the reading blog, it was observed that they did not participate as actively as they should. Their responses to the questionnaire items about what would have made the blog more effective plus input from the focus group indicated where the problems were.

A surprising 25 per cent of the students thought that a reward such as a prize, gift or token would motivate students to participate in the blog. Another 21 per cent suggested that the design of the blog be improved further. Complementary activities such as quizzes, contests, brain teasers, discussion and even exercises were thought to encourage more participation. Five participants mentioned that the lecturer needed to

be more active and to motivate them. One of the focus group members pointed out the need for more 'leadership' in the ER programme. The lecturer's participation was cited by several students to be a source of motivation. In addition the posts themselves were said to augment reader engagement if they contained humour, pictures, music and videos.

One of the focus group members who was not as enthusiastic about the reading blog as his counterparts suggested that linking the blog to Facebook would generate more interest and attract more participation. Another focus group member echoed this sentiment with the rationale that Facebook is so popular with these young people that linking this social network to the blog would help reduce the academic-*ness* of the activity and remove the pressure of perceived expectations from both peers and instructor, thus making this approach to ER more casual and engaging.

Conclusion

This exploratory study confirms that the blog is a useful and viable platform for supporting an ER programme. Its benefits are derived from allowing easy access to a vast resource of reading materials to cater to the diversified interests of a group of learners and the convenience and ease with which a group can select reading materials and deposit them in a common space for members to exercise the free will to read, not to read or to read again.

The students' favorable perception towards this social networking tool is another important endorsement for this alternative approach to ER. This study confirms that the use of this Web 2.0 tool appeals to this representative group of the Net Generation because it permits them to collaborate with their peers and to share their interests in the form of text. In the words of one of the participants, this generation "crave[s] their fellowmen's approval more than anything else" and they "by nature like to share and know about each other".

While this Web 2.0 platform appears to have passed the test as a tool as an alternative approach to a traditional language learning enhancement programme, there are some concerns that need appropriate response and further examination. One such issue is the difficulty faced by the learner in selecting reading materials.

In spite of, or perhaps it is more accurate to say *because of,* the huge resource of online reading materials, searching for reading materials to share was not as enjoyable as reading what was shared especially among the lower proficiency group. Hence, having too many options is also a deterrent. A possible solution is to provide a list of

recommended websites for those learners who need assistance at this stage of the programme while still allowing the rest who are more adept at Web searching to go beyond that list.

Contrary to Bhattacharya and Chauhan's (2010) research findings, the results of this study have debunked the idea that this interactive online platform could make the learner more independent and responsible in their learning. The warning by Day and Bamford (1998, p.126) concerning the lack of encouragement and concern on the part of the instructor would definitely lead to diminished interest and participation in an ER programme was found to be valid. Evidently, the use of the Web 2.0 resource does not eliminate the need for the teacher or lecturer's catalytic role. In spite of the accessibility, convenience and appeal of this online platform that encourages autonomous learning, the students were still unable to abandon their need or preference for traditional hand-holding. The use of the blog for ER was found to have minimum impact on learner autonomy which is evident in the students' preference for more active participation by the lecturer, structured activities to accompany the reading and some form of reward for their participation.

Further investigation is recommended especially on how and whether using the weblog and other social networking sites can significantly increase the effectiveness of ER in improving language. Once it can be established that the online platform can support the ER programme in all aspects of language learning, it could provide language instructors with an alternative approach that would help remove the reservations currently impeding the implementation of this worthwhile programme.

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