

## **Technology-enhanced language learning (TeLL): An update and a principled framework for English for Academic Purposes (EAP) courses**

## **L'apprentissage des langues assisté par la technologie (TeLL): mise à jour et énoncé de principes pour les cours d'anglais à des fins universitaires**

*Juliana Chau, Hong Kong Polytechnic University*

*Alfred Lee, Hong Kong Polytechnic University*

### **Abstract**

The range and number of technologies currently available have yielded both opportunities and challenges for language educators. This study aims to review recent technology-enhanced language learning (TeLL) research, and to examine their potential relevance to EAP pedagogy, curricula, assessment and instruction. The results of this study show TeLL research with rising interest in vocabulary, grammar and writing, but less so in speaking, listening, and reading. The results also reveal a shift from a tool-centric view of technology use to one that emphasises the technology-pedagogy-human alliance in the last decade, noting three emerging trends in recent TeLL studies, namely, those that are multi-purpose, multi-genre, and multi-role/skill in design and evaluation. The lack of a holistic approach to TeLL for EAP courses to date, however, has made it necessary and desirable to develop a framework for EAP-specific TeLL, to identify a principle for a generic TeLL programme, and to propound ways of operationalizing such a framework.

**Key words:** technology-enhanced language learning; English for Academic Purposes; socio-cultural learning, cognitive linguistics

### **Résumé**

La variété et la profusion de technologies actuellement disponibles ont engendré des possibilités nouvelles et des défis pour les enseignants en langue. Cette étude passe en revue la recherche récente consacrée à l'apprentissage des langues assisté par la technologie (TeLL) et examine sa pertinence éventuelle pour la pédagogie, les programmes, l'évaluation et l'enseignement de l'anglais à des fins universitaires. Les résultats de cette étude révèlent un intérêt croissant de la recherche sur l'apprentissage des langues assisté par la technologie pour le vocabulaire, la

grammaire et l'écriture, mais un intérêt moindre pour la langue parlée, la langue écoutée et pour la lecture. Les résultats révèlent aussi que, dans la dernière décennie, on est passé d'une utilisation des technologies centrée sur les outils à une utilisation privilégiant l'alliance technologie-pédagogie-humain. Trois tendances émergent dans les études récentes, à savoir celles qui sont multiusages, multigenres, et multirôles/habilités dans la conception et l'évaluation. L'absence actuelle d'une approche holistique de l'apprentissage des langues assisté par la technologie pour les cours d'anglais à des fins universitaires a cependant rendu nécessaires et souhaitables l'élaboration d'un cadre TeLL propre à l'anglais à des fins universitaires, l'identification du fondement pour un programme générique TeLL, ainsi que la proposition des moyens pour opérationnaliser un tel cadre.

### Introduction

The use of technology to improve language learning stretches back nearly a century, following Clarke's (1918) report on the use of phonograph recordings to model pronunciation for language learners. Since then, attempts to implement technology-enhanced language learning (TeLL) have invariably swung between short-term adoption and eventual abandonment in search of newer, and presumably more promising, technologies. Levy (2009, p.779), quoting Kohn and Hoffstaedter (2008), describes this pattern metaphorically as the "caravan effect", where peripatetic travellers (technology advocates) briefly stop to drink from a waterhole (the most recent technology), and then proceed to the next one to have their fill again. From single-function machines (e.g. Clarke, 1918) and mono-modal word-processing software (e.g. Harris, 1985) to multi-functional, interactive digital tools (e.g. Miyazoe & Anderson, 2010), contemporary technologies in language education are conceived more broadly than just computers to encompass specific authoring ware and commercial software tools, multimedia resources such as graphics, video and audio, web-mediated communication platforms as exemplified by blogs and wikis, as well as mobile devices including smart phones and tablet computers.

The range and number of technologies currently available have created both opportunities and challenges for language educators. Positive outcomes ascribed to TeLL use are cited in many studies that examine, for example, speaking (Hirotani, 2009; Walker, Cedergren, Trofimovich & Gatbonton, 2011), reading (Al-Seghayer, 2007; Murphy, 2007), writing (Godwin-Jones, 2008; Kuteeva, 2011), vocabulary (Loucky, 2003; Wible, Liu & Tsao, 2011), peer language learning (O'Rourke, 2005; Ware & O'Dowd, 2008), culture learning (Belz, 2005; Jin & Erben, 2007), and independent language learning (Chang, 2007; Polisca, 2006). Other studies (Levy, 2009; Liu, Moore, Graham & Lee, 2003), however, caution against over-generalization of the research findings. Language learning is a complex, multi-faceted process; its rate and route of acquisition is known to be mediated by variables including, but not limited to, learner motivation, learning context, prior experience, task design and purpose, and learners' understanding and expertise of the technological tool (Dornyei, 2003; Ellis, 2002; Levy, 1997; Oxford & Lin, 2011). TeLL research that ignores these factors is likely to compromise the demands of validity and reliability, thereby confounding efforts to understand, develop, use and evaluate TeLL.

Partly to gain insights into some of issues discussed above, several review studies of TeLL (Levy, 2009; Liu et al., 2003; Zhao, 2003) have been undertaken. The studies reviewed largely

acknowledged limited generalizability of findings due to the nature (small-scale, short duration) and pattern (exploratory, self-report, overlapping role of researcher, teacher and developer) of the research, while documenting overall favorable attitudes of users towards technology use. Reported enthusiasm aside, for effective technology-mediated language learning to occur, many language educators stress the need to “select and match tool to task” (Levy, 2009, p.777), to integrate technological learning strategy instruction into the curriculum of TeLL (Oxford & Lin, 2011), to design TeLL activities that create opportunities for meaning-driven linguistic input and output to achieve a communicative task goal (Chapelle, 1997), and to enhance awareness of the “pedagogical aspects of real classroom contexts” through additional TeLL research (Villada, 2009, p.385). While discussion of these and other issues is welcome, the multiplication and complexity of technological resources over the last decade has brought a new and challenging perspective to issues surrounding TeLL practice worthy of further scrutiny.

The purpose of this study is to seek evidence from TeLL practices as reported in recent studies in order to examine their potential relevance to the pedagogy and to the nature of approaches through which technologies might be incorporated into language curricula, assessment and instruction. One expected outcome of this study is to support and promote language educators’ use of technology through timely and relevant data in the field. This study differs from previous works in three respects. First, for recency of developments, this study included only data-based TeLL research published between 2007 and 2011, as distinct from those during, for example, 1990-2000 (Liu et al., 2003), 1997-2001 (Zhao, 2003), and 1980-2005 (Villada, 2009). Second, only research studies published online were chosen because advances in technology have facilitated more efficient dissemination of research findings to audiences across settings than traditional print materials. Third, the selection of studies was confined to research that investigated technological deployment to support English – be it as a second, foreign, or additional – language learning, but not other languages. The fact that English is the language of globalization involving a billion non-native speakers (Hu, 2004) warrants a close inspection of the impact of technology use on the large number of stakeholders in English language education. In this paper, TeLL refers specifically to the context of English language learning and is discussed in relation to EAP courses.

This study aims to pursue three interlinked goals:

1. to analyse recent research (2007- 2011) on technology-enhanced English language learning;
2. to identify patterns of recent attempts in technology-enhanced English language learning environments based on studies identified in 1); and
3. to develop a principled framework for EAP-specific TeLL by drawing on the findings generated by 1) and 2).

This paper comprises six sections. The research method will be outlined next, followed by a description and analysis of the research results. The analysis will provide the basis for a proposed framework for embedding technology into EAP curricula, instructional input and assessment. This paper will conclude with suggestions for areas of further consideration.

## Method

### Research Design

Earlier studies highlighted the need to scrutinize closely “the pedagogical options for using technology in the L2 classroom” (Salaberry, 2001, p.51), and to “continue to reflect on pedagogy in technology-mediated language learning environments and assess the extended use and value” (p.779) of both older and state-of-the art technologies. Heeding this concern, this study primarily sought to examine patterns of recent attempts in TeLL use for evidence that informs existing and future pedagogical practices in EAP courses. The analysis concentrated on research-based studies yielding qualitative and/or quantitative data published between 2007 and 2011. The decision was motivated by our desire to present an update of the role of technology in language learning as documented in data-driven studies; non-research based studies involving mostly conceptual discussion and project descriptions and potential seemed less suited to the purpose of the study.

### Data Sources and Procedures

The identification of the journals from which to select studies for analysis proceeded through four stages. First, four characteristics of the journals suited to this study were identified: readership (impact factor as reported by the respective journals), access (online availability), research orientation (empirical evidence), and relevance (correspondence with the focus of this study). Second, a search through the *Education Resources Information Centre* (ERIC), a widely used database by linguists and language educators that provides a rich source of published and unpublished materials, was conducted. Through expedient selection (Freebody, 2003), nine journals (Table 1) listed in ERIC that matched the four characteristics described above were chosen.

Table 1:

*Nine selected journals from which to identify relevant studies for analysis*

Journal	Impact Factor
1. English for Specific Purposes	1.358
2. TESOL Quarterly	0.646
3. Language Learning & Technology	1.222
4. Language Teaching Research	1.205
5. The Modern Language Journal	1.299
6. The Canadian Modern Language Review	0.519
7. The British Journal of Educational Technology	1.539
8. System	0.857
9. Journal of Computer Assisted-Learning	1.25

Second, a keyword search using, for instance, “technology and language learning”, was performed on each journal (Table 2). The search was limited by year (only publications between 2007 and 2011), document type (Word or PDF) and language (English only).

Table 2:  
*Results of a keyword search in the nine selected journals*

Key Word Search	No. of articles returned from each of the nine selected journals								
	ESP	TQ	LLT	LTR	MLJ	CMLR	BJET	Sy	JCAL
Technology & language learning	81	76					75	64	37
Technology & English language learning	81	73	54	3	273	56	13	12	8
Technology & second language learning	73	71	53			64	1		
Technology & second language acquisition	43	48					23	17	9
Computer-assisted language learning	9	16					45	3	32
ICT and language learning	3		1			7			
Technology and EAP	3	2					4	8	13
Computer-assisted English language learning		15	18		5	14			
Computer-aided language learning		2		3	5				29
Wiki & English		1	4		10	1		2	10
Blog & English		4		3	38	1		1	
Internet				24	216		3		

Key: ESP – English for Specific Purposes; TQ – TESOL Quarterly; LLT – Language Learning & Technology; LTR – Language Teaching Research; MLT – The Modern Language Journal; CMLR – The Canadian Modern Language Review; BJET – The British Journal of Educational Technology; Sy – System; JCAL – Journal of Computer-Assisted Learning

Third, a detailed analysis of the returned studies was carried out. Four parameters were established for the selection of the studies:

1. Publication time – between 2007 and 2011
2. Type of publication – online
3. Language under investigation – English as a second, foreign or additional language
4. Type of study – researched studies

Essentially, studies that were non-research based and/or involved the investigation of languages other than English were rejected. Non-research based studies refer mainly to those that either describe the application of a technological device or discuss a theoretical framework, as distinct from those that seek empirical evidence through experimentation or observation in researched studies. A total of 78 studies were found to fall within the four set parameters, and consequently selected for inclusion in the analysis. The fourth stage concerned organizing the data under nine

headings: 1) site of study; 2) time or duration of study; 3) number and profile of participants; 4) software or tool used; 5) language area or skill under scrutiny; 6) key results; 7) strengths as reported; 8) limitations as reported; 9) recommendations.

### **Limitations of This Study**

Three methodological shortcomings of the study deserve mention. The first is a lack of comprehensiveness in covering the major works in TeLL, given that the analysis sourced only 78 research-based studies from nine peer-reviewed journals. Additionally, it is reasonable to assume that the results would differ subject to whether a search was conducted through journals dedicated to TeLL alone or to language learning in broader contexts. Third, the analysis may suffer from bias because of its exclusion of studies that examined non-English foreign languages such as French, Spanish and German and of those published in languages other than English. However, the purpose of this study was not so much to construct a full chronological account of TeLL development as to sketch an update of TeLL practices that guide and inform current and future technology-embedded EAP pedagogy. As long as these limitations are acknowledged, this study offers instructive comparisons with prior research as well as reflections on future directions in the field.

A further point worthy of note is the way in which EAP is understood and re-negotiated in a changing academic landscape. EAP is generally defined as language research and instruction grounded in an understanding of the linguistic, socio-cognitive demands of academic disciplines to equip “students with the communicative skills to participate in academic and cultural contexts” (Hyland & Hamp-Lyons, 2002, p.2). More recently, the cultural dimension of EAP is highlighted in calls for creating courses that move beyond the practical concerns of language use to cover the interrogation of the social, political and historical sites in which communication occurs (see for example, Strain, 2013). In this study, EAP courses encompass broadly those that are offered in academic institutions to students studying English as a second or foreign language, targeting the development of discrete language skills such as vocabulary or writing, and/or discipline-specific communication within the academy and without. Essentially, communication is culture-bound, purpose-driven and multi-functional as participants assume different roles to realize the communicative intent of the event or process.

## **Results and Discussion**

The ensuing sections outline and discuss the key findings gleaned from 78 studies published between 2007 and 2011. The analysis is grouped into two categories: salient patterns and emerging trends.

### **Salient Patterns**

Of the 78 studies (Table 3) analysed, 28 discussed technology use in vocabulary and/or grammar, 27 in writing or writing-related skills, followed by 10 in speaking, while four each explored listening and reading, three on independent language learning, and on two peer review and language proficiency. Where Liu et al. (2003) identified writing and reading skills as the two mostly frequently explored areas, evidence from this study suggests greater interest in vocabulary and grammar and writing, less on reading. Still far less well-represented are studies concerning speaking and listening, mirroring the pattern reported by Liu et al.(2003).

Table 3:  
*Analysis of 78 TeLL research studies between 2007 and 2011*

<b>Journal</b>	<b>Language focus</b>	<b>Number of Studies</b>	<b>Technology</b>
<i>English for Specific Purposes</i> (n=18)	Vocabulary, grammar	11	WordSmith; Corpus Builder
	Writing	5	Wikis; Concordancer; email
	Academic speaking	1	Corpus
	Listening	1	Corpus
<i>TESOL Quarterly</i> (n=9)	Writing	4	Corpus; Web-based automated writing evaluation tools; keystroke logging
	Vocabulary, grammar	4	Corpus
	Self-access learning	1	Self-access multimedia software
<i>Language Learning &amp; Technology</i> (n=23)	Writing	9	MSN Messenger; Automated writing evaluation tools; Blackboard; Blogs; Wikis; Forums
	Vocabulary, grammar	5	Video games; VocabTutor; Blackboard
	Speaking	4	Voice blogs; interactive software; Corpus
	Listening	2	Video listening tests; CALL
	Reading	2	Multimedia
	Learner autonomy	1	Computer-generated visuals and feedback
<i>Language Teaching Research</i> (n=5)	Writing	2	Web 2.0; Chat tool in WebCT
	Vocabulary, grammar	2	Corpus; Computer-aided tool
	Reading	1	School Intranet; Blackboard
<i>The Modern Language Journal</i> (n=2)	Grammar	1	Corpus
	Speaking	1	Quest Atlantis; 3D virtual environment
<i>The Canadian Modern Language Review</i> (n=2)	Writing	1	Online Bulletin Board; WebCT
	Speaking	1	EduSpeak
<i>The British Journal of Educational Technology</i> (n=6)	Vocabulary, grammar	2	SMS; Wireless technologies
	Speaking+ critical thinking	1	Online discussion forums
	Speaking	1	Skype
	Writing, reading, grammar and vocabulary	1	Live broadcast of real-time classroom teaching
	Writing: meaning	1	Virtual learning community; online

	construction		interaction
<i>System</i> (n=10)	Writing; Online text reconstruction; Online writing	4	Corpus; Enigma Plus; Forums; Blogs; Wikis
	Vocabulary	2	Corpus; Online test
	Effects of training on Peer Review	1	Blogs
	Reading	1	Hypermedia documents
	Speaking	1	CMC
	Listening	1	Video listening test
	<i>Journal of Computer-Assisted Learning</i> (n=3)	Vocabulary	1
Self-monitoring language learning strategy		1	University Network – online course management system
Language proficiency		1	Electronic pocket dictionaries

The asymmetrical focus on vocabulary, grammar and writing appears to be the corollary of rapid advances in technology for language learning (Liu & Jiang, 2009; Walker, 2011a, b), coupled with growing empirical evidence linking knowledge of vocabulary (Ward, 2009) and/or grammar (Ellis, Loewen & Erlam, 2006) to language proficiency, with writing as a favored form of practice and assessment (Park & Kinginger, 2010).

The prevalence of corpus-informed research, especially the use of commercially developed corpora for academic contexts, seems to feature prominently in the analysis. Liu and Jiang (2009) explored the impact of integrating corpus and contextualized lexicogrammar in foreign and second language contexts. The British National Corpus and its condensed version, the BNC Baby, were selected for their study. Although their findings noted improvements in learners’ command and understanding of lexicogrammar, challenges included learners’ lack of familiarity and confidence with corpus search and analysis of corpus data, and the absence of “sophisticated search functions and capabilities in the existing corpus search engines” (p.70). Liu and Jiang concluded there should be correspondence between learning objectives, language proficiency, technological capacities, course design, and instructional approaches in corpus-based curricula.

Instead of lexicogrammar, Walker (2011a) sought to establish a collocational profile of 15 lexical items in business English using the Bank of English and British National Corpus that might contribute to learners’ mastery of English. He found that “collocations are not simply arbitrary” and that “a corpus-based study of the collocational behavior of a word can identify the different meanings or uses of that word” (p.111). He (2011b) further argued that such corpus data would provide partial or full explanations of lexical collocations beneficial to teachers and learners. Corpus technology was also shown to be influential in academic writing development. Yoon (2008) claimed the use of the Collins COBUILD Corpus helped her students tackle linguistic problems in academic writing, and become more attentive to common usage and collocations in writing, while echoing concerns that successful corpus application and integration into a writing course would hinge on students’ motivations and willingness, and teachers’

understanding of how “the multi-faceted aspects of technology use...could facilitate or impede the individual students’ L2 writing” (p.45).

Corpus technology aside, the results of the analysis reveal the deployment of wide-ranging courseware and software tools such as Blackboard, WebCT, and Web 2.0 (Table 3) for academic purposes, which is a possible consequence of the evolution and availability of high-quality technological educational resources over the last five years. This, in turn, can be said to account for the increasing adoption of commercially available software or tools, rather than self-developed products, to enhance language learning, a pattern that differed slightly from one identified in Zhao’s (2003) research. A pertinent example is the use of wikis and blogs to promote writing competence through collaborative efforts (Kessler, 2009), and to enhance reflective skills (Chik & Breidbach, 2011). At the same time, there is evidence in the analysis to suggest that major barriers to designing specific products to meet the pedagogical objectives of individual contexts are minimized through readily adaptable or amenable software programs. As an example, Chang and Kuo (2011) developed a specialized corpus for linguistic research and pedagogy, while applying the concordancing function of the computer software, AntConc3.0.1, for analysis and retrieval of rhetorical moves in research articles.

Additionally, the results of this study draw attention to four aspects that corroborate those in prior research (Levy, 2009; Liu et al., 2003; Salaberry, 2001; Zhao, 2003). First, evaluation of the pedagogical effectiveness of technological applications in language learning seems to rely mostly on surveys, questionnaires, and self-reports, often with a lack of convincing evidence showing whether or how language skills were improved. Another aspect is linked to the first where in many studies, the dual role of teacher-cum-researcher was believed to induce “experimenter demand effects” (Zizzo, 2010) on participating students, prompting questions of validity and reliability. Third, the dominant pattern of investigation remained that of a single technology on discrete language skills, leaving higher level processing such as critical thinking under-examined. Fourth, the duration of investigation of the studies analysed generally ranged from several weeks to a full semester, with the exception of a three-year longitudinal study (Miller, Lindgren & Sullivan, 2008); the short span generally failed to generate comprehensive data for systematic analysis that might illuminate the integration of technologies into language education.

Similarities to previous studies aside, evidence from the current analysis suggests notable exceptions, signaling emerging trends in TeLL, to be delineated next.

### **Emerging Trends**

The last decade has witnessed a shift of technologies from the periphery to the centre of language curricula, and in tandem, from a tool-centric view of adoption to one that recognizes the tripartite partnership of technology, pedagogy and human (Gruba & Hinkelman, 2012). Reflecting this change, TeLL research has moved from a concern with technological capabilities to effective use of technologies to encourage and support the language teachers and learners, the latter being a recurring theme that underpins two main strands of TeLL inquiry: design (development and implementation) and evaluation (review and revision). Evidence in the current analysis uncovers three emerging trends – multi-purpose, multi-genre and multi-skill/role – that characterize recent TeLL studies with a focus on design and evaluation. The discussion of each trend is illustrated below with an example extracted from the results of this study. These examples are not meant to

be models. They may show successful outcomes as well as constraints of technology use. They fall within the broad definition of EAP courses as understood in this paper.

**Multi-purpose.** Much of the TeLL research in this study tends to explore technology use in the light of these three functions in isolation: first, as a research tool, with researcher-derived instruments that monitor the ongoing progress of individuals; second, as an instructional supplement that assumes some of the teacher's duties; third, as a supportive learning environment to provide resources for independent language learning or continuous learning unassisted by the teacher. There is, none the less, a noticeable trend in the analysis for the design and implementation of TeLL with multiple purposes in mind, yielding potentially useful data for the researcher, teacher and learner.

A longitudinal study by Miller, Lindgren and Sullivan (2008) exemplifies this multi-purpose approach. Their study involved 17 non-English speaking high school students in Sweden, with each participant required to compose one essay in English using the computer over a three-year period. A key objective of the study was to ascertain and understand how second language writers approached text production and how their production processes developed over time through computer keystroke logging. In their view, this tool represented a “versatile and unobtrusive means of data collection because the resident software records all keystroke presses and yet appears as a normal text editor” (p.436), thus minimizing interference and distortion associated with other observational methods such as think-aloud protocol.

Miller et al. argued that the keystroke logging in their study held promise of examining TeLL practice from a combination of three perspectives. For the learner, access to logfiles means that writers can develop increased recognition of the otherwise hidden cognitive processes that undergird their own language production and writing performance. For the instructor, keystroke logging gives information and insights that may have a bearing on student writing and instructional strategies. For the researcher, the flexibility of the tool makes it ideal for data collection and analysis, and additionally, for consideration of data-informed pedagogy to enrich language learning. Although statistical evidence from Miller et al.'s research did not include feedback from teachers (“an insider's story”, according to Villada (2009, p.383)) and students (“a personal understanding of that specific technology's purpose and function”, as Levy stated (2009, p.778)), their findings suggest the multi-purpose approach can be cultivated for profit in the field of TeLL.

**Multi-genre.** The growing popularity of web-based interaction (e.g. text messages, emails, forum discussions) has given rise to a new mode of communication termed “Netspeak”, namely, a hybrid of speech and writing with “electronically mediated properties” (Crystal, 2006, p.51). Such properties are dynamic, Crystal explains, with “playful variations” introduced by users in an attempt to “capture the character of the electronic world, and to overcome the communicative limitations of its technology” (p.71). Crucially, Netspeak is a genre specific to online communication that entails users to have knowledge of and adopt conventions of oral and written discourse to their own communicative contexts. While discussion of Netspeak is recent and remains fluid, genre-based pedagogy to support second language writing development is well documented (Cheng, 2006; Hyland, 2003). Although small in number, a few studies in the current analysis reported efforts to explore emerging genres in web-mediated communication and their implications for language education. Miyazoe and Anderson's (2010) study represents an apt illustration of this multi-genre trend in TeLL research.

Miyazoe and Anderson sought to examine the learning outcomes and university students' perceptions of the simultaneous use of three asynchronous online writing tools, namely, forums, blogs and wikis, in order to replicate real-life contexts in which these tools are used. They adopted a mixed method approach, gathering qualitative and quantitative data from surveys, interviews and text analysis for triangulation. Sixty-one second-year students in a Japanese university participated in this semester-long study, during which they were required to use English in forum discussions and optional blogging activities, with the exception of the wiki collaborative project involving translation from English to Japanese. According to Miyazoe and Anderson, qualitative text analysis of students' forum and wiki writings revealed discernible levels of differentiation in their writing styles, and general success of the tools in facilitating qualitative changes in the students' writing abilities. Although there was no explicit discussion of genre-based pedagogy in their study, it is apparent the nature and requirements of the three online writing tasks call for genre knowledge, among others, to fulfil communicative needs (Hyland, 2003). Their study is indicative of the potential of online interaction as a social activity in which student-initiated genre-sensitive language is produced to establish and maintain relationship in order to realize specific goals.

**Multi-role/skill.** Many curricular programs that seek to achieve the objectives of an overall well-rounded education would include considerations that make links with graduate attributes ranging from problem-solving skills to technology use, global awareness, critical thinking and language skills (Gruba & Hinkelman, 2012). It follows that how language skills can be demonstrated to underpin the development of such attributes becomes a critical issue for many educators. As seen in Table 3, the majority of the studies analysed appear to skew towards the investigation of a single language skill; those that discussed overall language proficiency, learner autonomy or higher level concepts occupy a small percentage. With growing emphasis on holistic learner development, efforts to reframe the paradigm for TeLL through pedagogies designed to energize the development of multiple skills, and concomitantly, role negotiation, can be discerned. Research by Zheng, Young, Wagner and Brewer (2009) represents one such example.

Zheng et al. analysed the user chat logs and other artifacts of an intercultural and interactive online game/learning environment for English language learning. Specifically, they aimed to explore the way in which avatar-embodied collaboration between native and non-native speakers of English supplied resources for English language acquisition. Four adolescent girls (two from China and two from the United States) were paired in two native and non-native speaking dyads over a ten-week period to complete tasks in an online multiuser virtual environment by means of avatar interactions and communication tools such as chat, bulletin board and email. The pairs collaborated to solve content-related problems in English as embedded in the game play. Their study viewed learning English as a sociocultural process characterized by negotiation and co-involvement between participants as agents of change.

Based on the analysis of data collected from multiple sources (e.g. chat logs, emails, interviews), their study showed, through intercultural collaboration on problem-solving, participants successfully fulfilled the task goals during which emergent identity formation, meaning making, and language acquisition at both utterance and discourse levels occurred. Zheng et al. attributed this to participants' ability to use language "in a persistent form to collaborate in achieving a goal...[to] negotiate cultural identity as a byproduct of reaching a common goal...[and to] see

other's perspective (p.502). They also noted negotiation for meaning between the two students in the dyad involved role shifts where control in the role of instructor hinged on one's content knowledge, rather than on language proficiency. In their view, avatar-based interaction helped create group affinity through drama and character bonding, thus imbuing language tasks with purpose and meaning.

Zheng et al.'s study hints at a possible approach to operationalizing the technology-pedagogy-human alliance for the benefit of language education and holistic learner development. For technology, virtual environments hold promise of promoting identity formation and role negotiation that provide learners with multiple opportunities to use language and to obtain feedback on multiple levels in goal-driven, meaningful collaboration. For humans, especially language learners, a narrow view of language consisting merely of discrete grammar items is counterproductive. Rather, meaning (co-)construction entails communicative competence at multiple levels: grammatical, discursal, and pragmatic. For pedagogy, language educators would profit from a wider conception of skills to encompass not just linguistic, but also cognitive and metacognitive abilities that facilitate problem-solving, critical thinking and collaboration crucial for an all-rounded education.

Drawing on the results of this study reported above, a principled framework is proposed next to help articulate and guide EAP-specific TeLL pedagogical choices and decisions. The proposed framework is currently adopted by an EAP course offered at an English-medium university in Hong Kong. Results obtained from this research are being analysed and will be the focus of a future paper.

### **A Principled EAP-specific TeLL Framework**

As noted earlier, recent TeLL studies tend to be multi-purpose, multi-genre and multi-role/skill in design and focus, underlining a shift of technology use from being a tool for information retrieval and instruction to one for empowerment of both teachers and learners. What is missing, however, is a holistic model for a TeLL program that engages the language learner on perceptual, cognitive and hermeneutical levels so that linguistic features of a language activity and process become a pragmatic challenge of sense-making – the essence of communication. From this perspective, TeLL situates the language learner in an ecology of needs and purposes that serves to imbue the communication process with meaning and direction. This lends support to the call for “new pedagogical paradigms” for EAP education in digital realms that equip learners with new literacies and skills required for successful integration into specific communities of practice (Kuteeva, 2011, p.44).

The following sections thus propound a principled framework to reconceptualize TeLL for EAP pedagogy and EAP practitioners. Our framework drew inspiration from published works in sociolinguistics and cognitive linguistics (Kotov, 2002; Kristiansen, 2008; Oatley, 1996). Such works shaped the conception of our framework in three respects. First, as with all language use, EAP is a socially produced category that is negotiated and accomplished in social relationships. Second, EAP learners are active interpreters and modifiers in the way they relate to and interact with others and the environments. Third, environments mediated by technology create opportunities for developing socio- and meta-cognitive abilities and for constructing and transmitting cultural knowledge through linguistic acts. Our framework follows three steps (Fig. 1): 1) identifying a key principle that underpins a generic TeLL program; 2) developing a TeLL

framework specifically for EAP courses; and 3) operationalizing an EAP-specific TeLL framework.

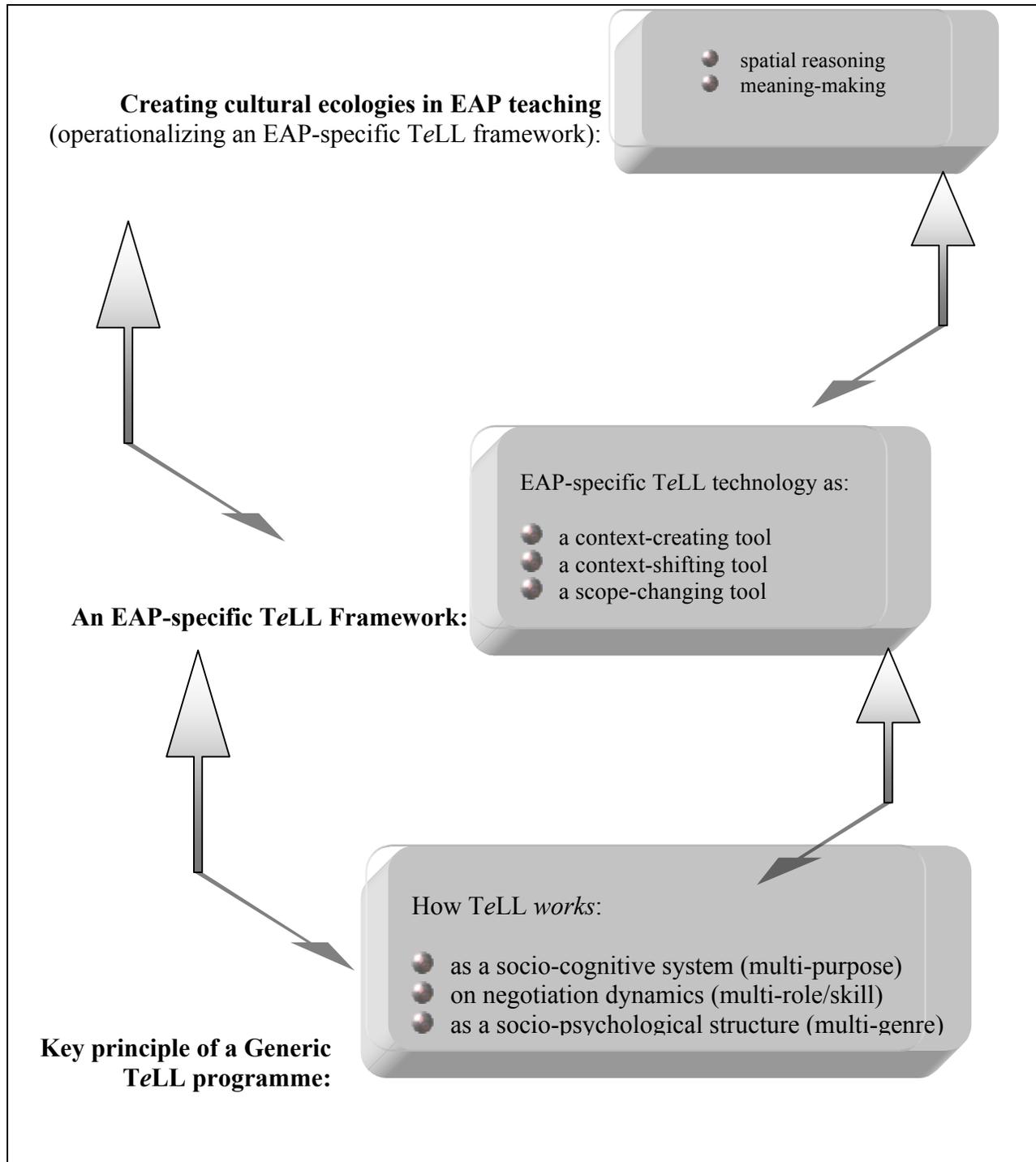


Figure 1. A principled TeLL framework for EAP courses

## Identifying a Principle for a Generic TeLL Program

TeLL's main pedagogical challenge for language practitioners who operate in a conventional course setting resides not only in the fact that a culture and a social system has been brought into a classroom, but that such a socio-cultural dimension is condensed in a technology whose design is based on social cognition (Boland, Tenkasi & Te'eni, 1994; Orlikowski, 2002). The challenge of a TeLL teaching and learning process has become that of a mastery of a socio-cultural task. To address this challenge, we need to identify a key principle of TeLL that encompasses three key features, with each corresponding loosely to the three emerging trends identified in this study: 1) TeLL needs to work *as a system* that models a situation: each TeLL feature is not only a part of a system, but a model of a socio-cognitive system involving purpose-driven practices (*multi-purpose*); 2) TeLL has to operate on *negotiation dynamics*: learning in TeLL occurs when a learner negotiates an electronic environment that is created out of an information system modeled on not only language use, but also human cognition which assumes the form of a social situation. The merit of TeLL is one which condenses and expands human cognitive processes; during such processes the learner needs to draw on a range of skills and to assume multiple roles (*multi-role/skill*); 3) TeLL needs to work *as a socio-psychological structure* that is created out of cultural dynamics of communicative events that demand the learner's knowledge of different genres (*multi-genre*) (Baloglu, 2000).

Crucially, TeLL re-constructs teaching and learning in terms of a communicative event that runs on social cognitive processes. Such an instructional and learning process engages participants in terms of negotiation dynamics, namely, meaning, as learners seek to make sense of and master a medium (or a technology) and a situation through language. Technology in this case represents environments that are constructed and re-constructed and the process is both cognitive and socio-epistemic (Farini, 2009). In order to identify a tool appropriate for this process, the user needs to understand *what* the tool is for and *what* it does; in the process of using such a tool, the tool and its user and the *situation* become one: the tool as an extension of the user in mastering a situation. How this shapes and informs a TeLL framework for EAP is examined next.

## Developing an EAP-specific TeLL Framework

For EAP courses, it is important for teachers to think of TeLL as a hermeneutic tool, i.e., interpretation and re-construction (Butler, 1998), and to conceive of TeLL's powerful dynamics as a medium. Each part in TeLL interacts with other parts as systems, which means that EAP teachers cannot work with TeLL parts in isolation. Communication is where parts or segments work as communal entities (Hecht, 1993; Winter & Taylor, 1999), which is what language is in the first place before it is analytically broken up into discrete items in pedagogical approaches not grounded in a communicative process. EAP-specific TeLL teachers, however, are those who re-interpret language firstly as the subject matter of a course and classroom processes, and secondly as communication, and regard TeLL as a communication and human system. EAP-specific TeLL, in this sense, embodies an overarching principle that re-conceptualizes technology as:

- a *context-creating tool*: TeLL is modeled on language performances as a human system; hence teachers and students who work with TeLL as participants in communication are engaged in behavioral terms; such behavior defines and redefines contexts as meaning (Dey, 2001).

- a *context-shifting tool*: As contexts are created and re-created, roles, and concomitantly, identities, are redefined not only as human participants, but also as objects such as the course environment. A community in effect emerges as communication and meaning is created; what emerges out of the local features of a communication process is modeled on and generated by a TeLL program. Different socio-cognitive orders also emerge; so do language processes that are enacted and embodied in TeLL as information systems (Xu, Kemeny, Park, Frattali & Braun, 2005).
- a *scope-changing tool*: For the aforementioned reason, scope which emerges from a linguistic and cognitive order is expanded by TeLL's communicative dynamics. This is a matter of both collapsing boundaries, as well as transforming cognitive and affective orders. With TeLL, both teachers and learners are situated in a community that is brought about by language.

It is worth noting that each one of the above works as a block in culture-building (Shneiderman & Rose, 1997). What TeLL ushers into a classroom is nothing less than a culture in terms of a cognitive space and a temporal and spatial order that not only eliminates physical confines, but is built on language principles as a socio-cognitive system (Kristiansen, 2008), where information, i.e., an ecology, or a communal entity, embodied as a social practice, arises from and serves negotiation dynamics (Star & Ruhleder, 1996). Technology as a tool is one that enables humankind to re-negotiate time and space and hence a social and cognitive order is accomplished. TeLL in this sense constructs for the EAP teacher a cultural ecology out of any language items that are to be 'taught', as learners are engaged as participants in such socio-cultural space and fields that reside in language. The next section describes ways of operationalizing this framework to construct a cultural ecology out of language tasks.

### **Operationalizing an EAP-specific TeLL Framework**

In our framework, EAP tasks are those which foster 1) spatial reasoning, and 2) meaning-making in creating a cultural ecology via linguistic acts.

First, spatial reasoning: spatial reasoning emerges from learners' negotiation with a medium. Learners in a technology-mediated environment find themselves manipulating discursive objects that interact in a systems sense, which means that TeLL participants have to relate items in terms of a meaning that they construct out of the technology components. In fact, what emerges is an ecological thinking and it is in this sense that a TeLL environment is more engaging than a classroom: not only does a TeLL environment accentuate meta-cognitive thinking (managing an environment), it also creates meaning and significance that is personal and individual (managing personal meaning in an alien environment) for the learner. Learning occurs as the learner makes efforts to generate and integrate knowledge in a TeLL environment where both explicit and implicit learning tasks are embedded. Learning, in other words, comes from a construction of personal meaning and knowledge (Levinson, Kita, Haun & Rasch, 2002).

Spatial reasoning and an ecological thinking are especially important for EAP, given the shifting paradigms that see academic literacy as mastery of not just reading and writing skills, but also cultural knowledge required to frame messages in ways that align with specific cultural and institutional communities (Hyland & Hamp-Lyons, 2002). TeLL learning occurs when a learner creates a mental and cognitive (spatial) model of an environment out of such tasks that are

embedded in it. Learning items in TeLL are presented in terms of occasions that call for social action. The TeLL experience becomes a creative one that taps into a learning instinct that is traceable to its evolutionary origins (Atick, 1992; Oatley, 1996).

Second, meaning-making: TeLL works as learners configure socio-cognitive models out of language as a biological and existential need for meaning or communication with an environment. What in effect is created is a semiosphere out of discrete language items and tasks. The issue of meaning here is a matter of not just management and interpretation but strategies and strategic values, because at issue in a semiosphere is a biological being's level and success of engagement for growth. In fact, the challenge of an EAP-specific TeLL task is an understanding of learners as agents of change in an environment via technology; one such challenge pertains to language use. Language, in this sense, is situated in a global perspective of human evolution, a perspective which opens up opportunities for the language learner and teacher to access the rich resources of human learning and evolution in a classroom (Bielenia-Grajewska, 2009) mediated by technology.

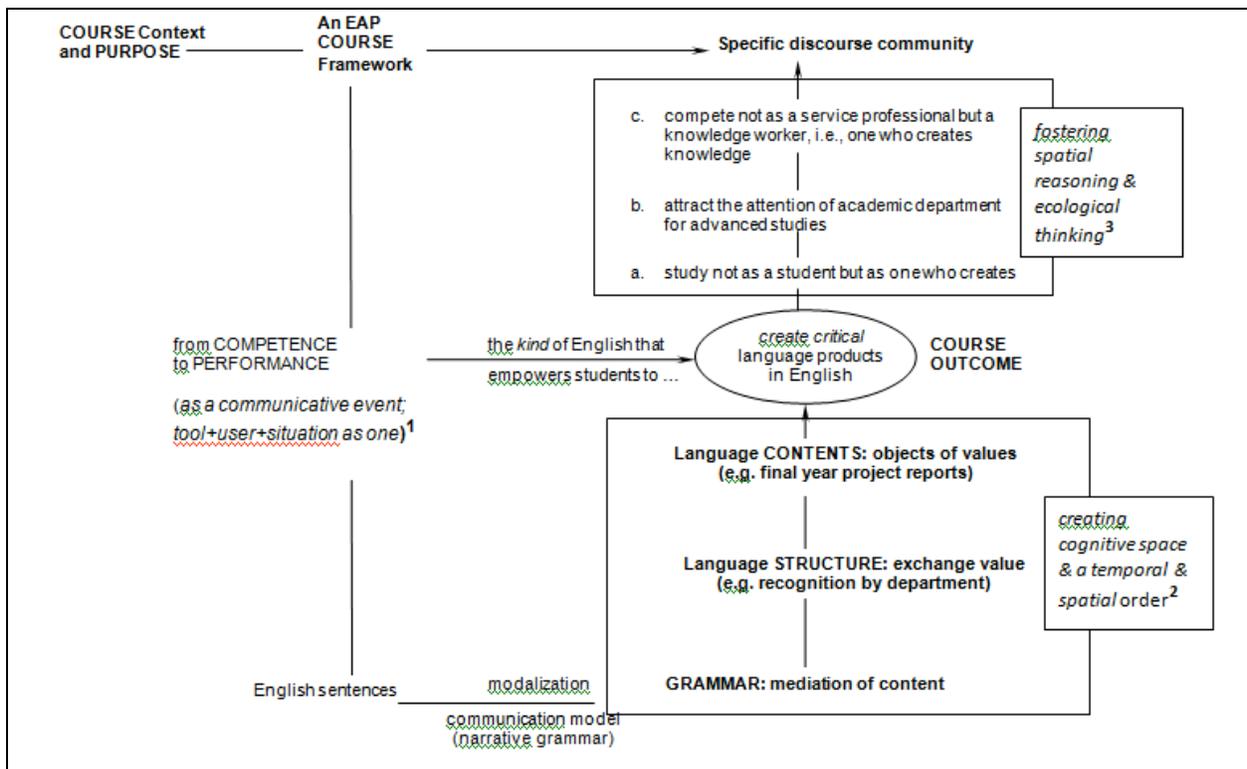


Figure 2. Articulating and implementing the three steps of the proposed TeLL framework in an EAP course

Key (Superscript <sup>1,2,3</sup>)

Step 1 - Identifying a principle for a generic TeLL program

Step 2 - Developing an EAP-specific TeLL framework

Step 3 - Operationalizing an EAP-specific TeLL framework

Most importantly, EAP learners do not just learn grammar or how grammar works in writing or reading, but develop a knowledge of how grammar as language in communication works in one's construction of meaning and knowledge in an environment; grammar is that which enables one to succeed in an ecology of socio-cultural practices. Given the semiotic nature of such a process, a TeLL program engenders an electronic space and time that is only limited by the imagination and keenness of the learner. The learner is the key; cognition is the field of play and TeLL is a human technology (Bateson, 2000; Kotov, 2002).

Figure 2 shows one possible way in which the three steps proposed for the TeLL framework (Fig. 1) can be articulated and implemented in an EAP course.

As seen in Figure 2, an important principle for the EAP-specific TeLL program (Step 1) is to move away from constructing an EAP course as little more than an exercise concerned primarily with the teaching of language skills. Instead, such a course can be an intellectual site of inquiry that helps understand and refine not just *what* language to use (competence), but also *how* and *when* to produce it (performance) to gain membership into their specific discourse communities. When students see language contents and structure, as mediated by grammar, as objects of value that can generate rewards (e.g. external recognition), their engagement with assigned readings or assessment tasks sharpens their awareness of the systematic workings of cultural institutions in their learning (Step 2). Integrating technology into such a course also creates the cognitive and temporal space needed for critical analysis that shifts technology from a role of unquestioning acceptance to one of strategic deployment (Kiefer, 2013), with students as critics rather than as consumers of technology. Spatial reasoning supports students' efforts in evaluating their own language products in terms of linguistic abilities, technological skills, and social achievements, i.e., the extent to which disciplinary recognition is bestowed on their products (Step 3). Such efforts demonstrate students' socio-cognitive awareness of themselves as co-creators of knowledge, and as producers of language as a means of extending thinking and formulating ideas beyond the academy.

### Conclusion

This study has reviewed recent TeLL research and identified patterns of recent attempts in TeLL environments. Salient patterns reported in the analysis included rising interest in vocabulary, grammar and writing, whereas studies concerning speaking, listening and reading were less well-represented (Liu et al., 2003). Corpus-informed research featured prominently, too, probably due to the availability of commercially developed corpora (Liu & Jiang, 2009). Our analysis has also revealed a shift from a tool-centric view of technology use to one that emphasizes the technology-pedagogy-human alliance in the last decade (Gruba & Hinkelman, 2012), noting three emerging trends in recent TeLL studies, namely, those that are multi-purpose, multi-genre, and multi-role/skill in design and evaluation. The lack of a holistic approach to TeLL for EAP courses to date, however, has made it necessary and desirable to develop a framework to re-conceptualize technology as a context-creating, context-shifting, and scoping changing tool, and to re-frame TeLL as a socio-cognitive system, a dynamic infrastructure for negotiation, and a socio-psychological structure (Fig. 1 & Fig. 2).

Two main contributions accrue from this study, despite the methodological limitations noted earlier in this paper. First, this study has provided timely and relevant data for EAP educators interested in implementing technology-enabled EAP curricula, assessment and instruction that

are congruent with paradigm shifts in EAP pedagogy in the digital age. Second, our framework highlights a holistic system aimed to harness an EAP learner's affective and cognitive abilities in a TeLL environment in order to build a community and a culture through linguistic acts. Our framework has been used to develop an EAP course currently taken by first-year students at an English-medium university in Hong Kong. A research project has been undertaken to investigate the effects of this EAP course on students and to examine the implications for future applications of this framework across settings. The results of the project will be analysed and reported in a future paper.

### **Suggestions for Future Research**

We believe research should focus on how a belief system could be created out of a holistic TeLL structure, one that embraces a teacher and an institution (Orlikowski & Gash, 1994; Orlikowski & Robey, 1991), not just a teacher's pedagogical beliefs (Ertmer, 2005). The issue is not a matter of ascertaining the extent to which TeLL contributes to language teaching and learning, but how TeLL transforms language teaching. TeLL research should not be conducted in functional terms alone - as a tool for measuring effectiveness; such an approach would reduce TeLL to nothing more than an administrative, teaching or learning support system. Instead, a desirable focus would be on TeLL as a cognitive ecology and a socio-cognitive order that have been created out of a modeling of human cognition, which, in turn, re-creates human cognition.

Such a belief system which resides in culture and in making sense of an environment should be analysed on a cognitive and affective level. An EAP-specific TeLL as a socio-cognitive system calls for a re-conceptualization of both learning and language itself as a subject matter (Fig. 2). TeLL works as a cultural system and a perceptual (cognitive and affective) tool for constructing and navigating a culture, and so what comes next on a TeLL research agenda is how language is (re-) conceptualized in such a cultural system, according to the cognitive and affective resources that have been made available by TeLL as a cognitive technology. Research on a conceptualization of how language works (not simply 'what language is') as it is presented in print media in EAP courses, as contrasted with that of how such a human activity works as it is presented for appropriation in a cultural environment that is electronically created, should expand our understanding of how language works and what language is as an ecology that engages fundamental human processes and activities of thinking via sense making.

The third item on a TeLL research agenda should concentrate on how EAP teachers and learners can be transformed into managers of an environment and an ecology. An ecology is essentially an open system where growth is limited only by humans and our responses to language. Hence, EAP in TeLL as a species of English and a cultural and human activity should be viewed and examined as an ecological entity. Language, via TeLL, needs to be analysed in ecological as well as syllogistically grammatical terms, which is what language is in the first place. Such a research strand should reclaim for a classroom such human processes and activities that are fundamental in language growth, but have been lost in a teaching and learning order that is shaped by print and syllogistic logic. Only research with this focus at its heart can do full justice to the value of TeLL.

References

- Al-Seghayer, K. (2007). The role of organizational devices in readers' construction of mental representations of hypertext context. *CALICO Journal*, 24(3), 531-559.
- Atick, J.J. (1992). Could information theory provide an ecological theory of sensory processing? *Network: Computation in Neural Systems*, 3(2), 213-251.
- Baloglu, S. (2000). A path analytic model of visitation intention involving information sources, socio-psychological motivations, and destination image. *Journal of Travel & Tourism Marketing*, 8(3), 81-90.
- Bateson, G. (2000). *Steps to an ecology of mind*. Chicago: University of Chicago Press.
- Belz, J. (2005). Intercultural questioning, discovery and tension in Internet-mediated language learning partnerships. *Language and Intercultural Communication*, 5(1), 3-39.
- Bielenia-Grajewska, M. (2009). Actor-network theory in intercultural communication: translation through the prism of innovation, technology, networks and semiotics. *International Journal of Actor-Network Theory and Technological Innovation*, 1(4), 53-69.
- Boland, R.J., Tenkasi, R.V., & Te'eni, D. (1994). Designing information technology to support distributed cognition. *Organization Science*, 5(3), 456-475.
- Butler, T. (1998). Towards a hermeneutic method for interpretive research in information systems. *Journal of Information Technology*, 13, 285-300.
- Chang, M.M. (2007). Enhancing web-based language learning through self-monitoring. *Journal of Computer Assisted Learning*, 23, 187-196.
- Chang, C. & Kuo, C. (2011). A corpus-based approach to online materials development for writing research articles. *English for Specific Purposes*, 30, 222-234.
- Chapelle, C. (1997). CALL in the year 2000: Still in search of research paradigms? *Language Learning & Technology*, 1(1), 19-43.
- Cheng, A. (2006). Understanding learners and learning in ESP genre-based writing instruction. *English for Specific Purposes*, 25, 76-89.
- Chik, A. & Breidbach, S. (2011). Online language learning histories exchange: Hong Kong and German perspectives. *TESOL Quarterly*, 45, 553-564.
- Clarke, C.C. (1918). The phonograph in modern language teaching. *The Modern Language Journal*, 3(3), 116-122.

- Crystal, D. (2006). *Language and the Internet*. Cambridge: Cambridge University Press.
- Dey, A.K. (2001). Understanding and using context. *Personal and Ubiquitous Computing*, 5(1), 4-7.
- Dornyei, Z. (2003). Attitudes, orientations, and motivations in language learning: Advances in theory, research, and applications. *Language Learning*, 53(1), 3-32.
- Ellis, R. (2002). Does form-focused instruction affect the acquisition of implicit knowledge? *Studies in Second Language Acquisition*, 24, 223-236.
- Ellis, R., Loewen, S. & Erlam, R. (2006). Implicit and explicit corrective feedback and the acquisition of L2 grammar. *Studies in Second Language Acquisition*, 28, 339-368.
- Ertmer, P.A. (2005). Teacher pedagogical beliefs: the final frontier in our quest for technology integration? *Educational Technology Research and Development*, 53(4), 25-39.
- Farini, F. (2009). Activities 2: Coordinating reflection. In C. Baraldi (Ed.), *Dialogue in intercultural communities: From an educational point of view* (pp. 155-172). Amsterdam: John Benjamins Publishing.
- Freebody, P. (2003). *Qualitative research in education: Interaction and practice*. London: Sage Publications.
- Godwin-Jones, R. (2008). Emerging technologies – web-writing 2.0: Enabling, documenting and assessing writing online. *Language Learning & Technology*, 12(2), 7-13.
- Gruba, P. & Hinkelman, D. (2012). *Blending technologies in second language classrooms*. New York: Palgrave Macmillan.
- Harris, J. (1985). Student writers and word processing: A preliminary evaluation. *College Composition and Communication*, 36(3), 323-330.
- Hecht, M.L. (1993). 2002-a research odyssey: Toward the development of a communication theory of identity. *Communication Monographs*, 60(1), 76-82.
- Hirovani, M. (2009). Synchronous versus asynchronous CMC and transfer to Japanese oral performance. *CALICO Journal*, 26(2), 413-438.
- Hu, X. Q. (2004). Why China English should stand alongside British, American, and the other ‘world Englishes’. *English Today*, 20(2), 26-33.
- Hyland, K. (2003). Genre-based pedagogies: A social response to process. *Journal of Second Language Writing*, 12, 17-29.

- Hyland, K. & Hamp-Lyons, L. (2002). EAP: Issues and directions. *Journal of English for Academic Purposes*, 1, 1-12.
- Jin, L. & Erben, T. (2007). Intercultural learning via instant messenger interaction. *CALICO Journal*, 24(2), 291-311.
- Kessler, G. (2009). Student-initiated attention to form in wiki-based collaborative writing. *Language Learning & Technology*, 13(1), 79-95.
- Kiefer, K. (2013). How does technology fit into the vertical writing curriculum? In M.M. Strain (Ed.), *Principles and practices: Discourses for the vertical curriculum* (pp.89-106). New York, NY: Hampton Press.
- Kohn, K. & Hoffstaedter, P. (2008). *Authenticated language learning with do-it-yourself corpora*. Paper presented at the 13<sup>th</sup> International CALL Conference, Antwerp, Belgium.
- Kotov, K. (2002). Semiosphere: A chemistry of being. *Sign Systems Studies*, 30(1), 41-54.
- Kristiansen, G. (2008). Style-shifting and shifting styles: A socio-cognitive approach to lectal variation. In G. Kristiansen & R. Dirven (Eds.), *Cognitive sociolinguistics: Language variation, cultural models, social systems* (pp. 45-90). New York: Mouton de Gruyter.
- Kuteeva, M. (2011). Wikis and academic writing: Changing the writer-reader relationship. *English for Specific Purposes*, 30, 44-57.
- Levinson, S.C. Kita, S., Haun, D.B.M. & Rasch, B.H. (2002). Returning the tables: Language affects spatial reasoning. *Cognition*, 84(2), 155-188.
- Levy, M. (1997). *Computer-assisted language learning: Context and contextualization*. New York: Oxford University Press.
- Levy, M. (2009). Technologies in use for second language learning. *The Modern Language Journal*, 93, 769-782.
- Liu, D. & Jiang, P. (2009). Using a corpus-based lexicogrammatical approach to grammar instruction in EFL and ESL contexts. *The Modern Language Journal*, 93(1), 61-78.
- Liu, M., Moore, Z., Graham, L., & Lee, S. (2003). A look at the research on computer-based technology use in second language learning: A review of the literature from 1990-2000. *Journal of Research on Technology in Education*, 34(3), 250-273.
- Loucky, J.P. (2003). Using computerized bilingual dictionaries to help maximize English vocabulary learning at Japanese colleges. *CALICO Journal*, 21(1), 105-129.

- Miller, K.S., Lindgren, E. & Sullivan, K.P.H. (2008). The psycholinguistic dimension in second language writing: Opportunities for research and pedagogy using computer keystroke logging. *TESOL Quarterly*, 42 (3), 433-454.
- Miyazoe, T. & Anderson, T. (2010). Learning outcomes and students' perceptions of online writing: Simultaneous implementation of a forum, blog, and wiki in an EFL blended learning setting. *System*, 38, 185-199.
- Murphy, P. (2007). Reading comprehension exercises online: The effects of feedback, proficiency and interaction. *Language Learning & Technology*, 11(3), 107-129.
- Oatley, K. (1996). Inference in narrative and science. In D.R. Olson & N. Torrance (Eds.), *Modes of thought: Explorations in cultural cognition* (pp.123-140). Cambridge: Cambridge University Press.
- Orlikowski, W.J. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. *Organization Science*, 13(3), 249-273.
- Orlikowski, W.J. & Gash, D.C. (1994). Technological frames: Making sense of information technology in organizations. *ACM Transactions on Information Systems*, 12(2), 174-207.
- Orlikowski, W. J. & Robey, D. (1991). Information technology and the structuring of organizations. *Information Systems Research*, 2(2), 143-169.
- O'Rourke, B. (2005). Form-focused interaction in online tandem learning. *CALICO Journal*, 23(3), 433-466.
- Oxford, R. L. & Lin, C. (2011). Autonomous learners in digital realms: Exploring strategies for effective digital language learning. In B. Morrison (Ed.), *Independent language learning: Building on experience, seeking new perspectives* (pp.157-171). Hong Kong: Hong Kong University Press.
- Park, K. & Kinginger, C. (2010). Writing/Thinking in real time: Digital video and corpus query analysis. *Language Learning & Technology*, 14(3), 31-50.
- Polisca, E. (2006). Facilitating the learning process: An evaluation of the use and benefits of a virtual learning environment (VLE)-enhanced independent language learning program (ILLP). *CALICO Journal*, 23(3), 499-515.
- Salaberry, M.R. (2001). The use of technology for second language learning and teaching: A retrospective. *The Modern Language Journal*, 85(1), 39-56.
- Shneiderman, B. & Rose, A. (1997). Social impact statements: Engaging public participation in information technology design. In B. Friedman (Ed.), *Human values and the design of computer technology* (pp. 117-134). Stanford, CA: CSLI Publications.

- Strain, M. M. (Ed.) (2013). *Principles and practices: Discourses for the vertical curriculum*. New York, NY: Hampton Press.
- Star, S.L. & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research*, 7(1), 111-134.
- Villada, E.G. (2009). CALL evaluation for early foreign language learning: A review of the literature and a framework for evaluation. *CALICO Journal*, 26(2), 363-389.
- Walker, C. (2011a). How a corpus-based study of the factors which influence collocation can help in the teaching of business English. *English for Specific Purposes*, 30, 101-112.
- Walker, C. P. (2011b). A corpus-based study of the linguistic features and processes which influence the way collocations are formed: some implications for the learning of collocations. *TESOL Quarterly*, 45(2), 291-312.
- Walker, N.G., Cedergren, H., Trofimovich, P. & Gatlinton, E. (2011). Automatic speech recognition for CALL: A task-specific application for training nurses. *The Canadian Modern Language Review*, 67(4), 459-479.
- Ward, J. (2009). A basic engineering English word list for less proficiency foundation engineering undergraduates. *English for Specific Purposes*, 28, 170-182.
- Ware, P.D. & O'Dowd, R. (2008). Peer feedback on language form in telecollaboration. *Language Learning & Technology*, 12(1), 43-63.
- Wible, D., Liu, A.L.E. & Tsao, N.L. (2011). A browser-based approach to incidental individualization of vocabulary learning. *Journal of Computer Assisted Learning*, 27, 530-543.
- Winter, S.J. & Taylor, S.L. (1999). The role of information technology in the transformation of work: A comparison of postindustrial, industrial, and protoindustrial organization. In G. DeSanctis, & J. Fulk (Eds.), *Shaping organization form: Communication, connection, and community* (pp.101-128). Thousand Oaks, CA: Sage Publications.
- Xu, J., Kemeny, S. Park, G., Frattali, C. & Braun, A. (2005). Language in context: Emergent features of word, sentence, and narrative comprehension. *Neuroimage*, 25(3), 1002-1015.
- Yoon, H. (2008). More than a linguistic reference: The influence of corpus technology on L2 academic writing. *Language Learning & Technology*, 12(2), 31-48.
- Zhao, Y. (2003). Recent developments in technology and language learning: A literature review and meta-analysis. *CALICO Journal*, 21(1), 7-27.

Zheng, D., Young, M.F., Wagner, M.M. & Brewer, R.A. (2009). Negotiation for action: English language learning in game-based virtual worlds. *The Modern Language Journal*, 93(4), 489-511.

Zizzo, D.J. (2010). Experimenter demand effects in economic experiments. *Experimental Economics*, 13(1), 75-98.

## Authors

Juliana Chau holds a PhD in language education. She has researched, published and presented papers on technology-enhanced language learning, second language acquisition, socio-cultural learning and self-regulated learning. She currently coordinates and teaches EAP courses at The Hong Kong Polytechnic University. Email: [ecjchau@polyu.edu.hk](mailto:ecjchau@polyu.edu.hk)

Alfred Lee, a language instructor at The Hong Kong Polytechnic University, has taught and developed EAP courses for a variety of disciplines for almost 20 years out of semiotics and systemic function linguistics with active interest in language learners being 'cultural agents'. He has presented papers on Bateson, Peirce, Halliday, Vygotsky and Greimas. Email: [alfred.lee@polyu.edu.hk](mailto:alfred.lee@polyu.edu.hk)



This work is licensed under a Creative Commons Attribution 3.0 License.