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## The Potential of ICT to Promote Academic Language Learning

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# The Potential of ICT to Promote Academic Language Learning

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## SUMMARY

*This paper argues that the pedagogical possibilities of ICT must be clearly understood if ICT is to fulfill its potential within the educational system. ICT is minimally useful as a pedagogical tool when it is assimilated into a rigid top-down teacher-centered textbook-oriented curriculum. Within this context, it becomes little more than an electronic worksheet, at considerably greater cost. However, when ICT is integrated into a more dynamic and socially-transformative pedagogical orientation, it has enormous potential to promote academic language learning, thinking and problem-solving abilities, imagination, and affirmation and expansion of student identities. Unfortunately, current trends in many countries, particularly for schools serving low-income students, reflect the former one-size-fits-all pedagogical orientation rather than the more dynamic “knowledge generation” orientation associated with a pedagogy of collaborative critical inquiry. The potential of ICT to support both L1 and L2 literacy development (academic language learning) is illustrated with reference to a program entitled e-Lective Language Learning, developed by Sotirios Chascas and Jim Cummins, that uses written text as input for language and literacy development.*

**KEYWORDS:** *Academic language learning, e-Lective Language Learning program, pedagogy, reading comprehension, vocabulary knowledge*

## THE CURRENT STATUS OF ICT IN EDUCATION

We live in a world where population mobility and technological change are rapidly transforming social, economic, and educational realities. The fact that cross-cultural and cross-linguistic contact is at an all-time high in human history has resulted in increased demands on the education systems in many countries. Intercultural education is seen as necessary for both the social purpose of promoting tolerance and cooperation within and between societies, and for the economic purpose of facilitating business in a global economy. Technological change and the information explosion have also resulted in demands that schools promote higher levels of conventional literacy (reading and writing skills) together with expertise in new forms of literacy (e.g. computer literacy, media literacy) that are emerging in unpredictable ways.

The normalization of cultural and linguistic diversity in schools together with the increasing infusion of sophisticated technologies into all aspects of society has created both challenges and opportunities for education. Specifically, is it feasible or reasonable to expect a one-size-fits-all homogenized curriculum to meet the needs of an increasingly diverse student body? To what extent should the education system attempt to acknowledge and promote the linguistic and cultural resources that students bring to school? If we see it as educationally desirable to promote students'

multilingual and multicultural potential in schools, then what kinds of curricula and pedagogy are likely to achieve this goal? How do we evaluate a differentiated approach to curriculum and pedagogy as opposed to a homogenized centrally-imposed model?

During this period also, technological change has escalated and the phenomenon of “globalization” has gathered momentum. As a result, schools are expected to prepare students for a new economy that is technologically sophisticated and operating in the global arena. Just as technology has infiltrated virtually every sphere of human endeavor, access to technology has increased in schools, albeit unevenly across ethnocultural and income groups. In North America, many politicians and promoters of privatized schooling see computers and the Internet as a means of increasing the productivity and cost effectiveness of schools. Others are much more skeptical, pointing to the fact that computer technology appears to have had little overall impact in improving academic achievement.

Clearly, ICT permits powerful access to informational and people resources as documented in a number of case studies of sister class projects around the world (e.g. Cummins & Sayers, 1995; Kourtis-Kazoullis & Skourtou, in press). However, these projects are very much the exception rather than the rule in education systems. A major reason is that such projects do not fit easily within rigid centrally-imposed curricula where the textbook dominates teacher-student interaction and high-stakes testing ensures that teachers do not stray off-task. The focus on raising test scores has had more impact on low-performing schools, usually in low-income areas, than on more affluent schools. Increasingly, (in the United States, for example) behaviorist drill-and-practice pedagogy dominates in these schools with teachers teaching directly to what they believe will be on the test. Not surprisingly, in these contexts computers are used primarily to transmit information and skills in very much the same way that paper-and-pencil worksheets have been used for generations. By contrast, in affluent areas there is more likelihood that ICT will be used in more powerful and creative ways.

In summary, although ICT incorporates significant potential to boost academic achievement dramatically among underachieving students, this potential remains unrealized for a number of reasons including:

- lack of teacher preparation to use computers;
- lack of integration of computer technology with instructional approaches to teach content standards;
- high-stakes testing that virtually forces teachers to teach to the test with the result that computer use is perceived as an add-on activity that is “off-task;”
- a focus on drill-and-practice computer use in low-income and inner-city schools.

The present paper focuses on one central aspect of how ICT could raise the achievement levels of students. Sotirios Chascas and I have developed a computer program entitled *e-Lective Language Learning* designed explicitly to promote students’ academic language proficiency. I will first outline what is meant by “academic language proficiency” and contrast this construct with other aspects of proficiency in a language. Then I highlight the research documenting that extensive reading is crucial for gaining access to the academic language that is found primarily in written text. Finally, the program itself is described and its rationale discussed. The empirical research and theoretical assumptions underlying the program are very much at variance with current trends to homogenize instruction and impose a one-size-fits-all pedagogy on teachers and

students. Thus, discussion of the program provides a window on the broader pedagogical changes that are required to implement effective ICT use in schools.

## **THE NATURE OF ACADEMIC LANGUAGE PROFICIENCY**

In order to understand patterns of academic development, we must distinguish between three very different aspects of proficiency in a language: (a) conversational fluency, (b) discrete language skills, and (c) academic language proficiency. The rationale for making these distinctions is that each dimension of proficiency follows very different developmental paths among both first and second language learners in school and each responds differently to particular kinds of instructional practices in school.

### **Conversational fluency**

This dimension of language proficiency represents the ability to carry on a conversation in familiar face-to-face situations. The vast majority of native speakers of a language have developed conversational fluency when they enter school at age 5. This fluency involves use of high frequency words and simple grammatical constructions. Second language learners (SLL) generally develop fluency in conversational aspects of the majority language within a year or two of intensive exposure to the language either in school or in the environment.

### **Discrete language skills**

These skills reflect specific phonological, literacy and grammatical knowledge that students can acquire in two ways: (a) through direct instruction; (b) through immersion in a literacy- and language-rich environment either in home or school. Students exposed to a literacy-rich environment in the home generally acquire initial literacy-related skills, such as phonemic awareness and letter-sound correspondences, with minimal difficulty in the early grades of schooling.

Some of these discrete language skills are acquired early in schooling and some continue to be acquired throughout schooling (e.g. spelling). The discrete language skills acquired early include knowledge of the letters of the alphabet, the sounds represented by individual letters and combinations of letters, and the ability to decode written words into appropriate sounds. Some of these skills such as phonemic awareness and knowledge of the letters of the alphabet show consistently moderate relationships with the acquisition of word decoding skills (Snow, Burns, & Griffin, 1998; National Reading Panel, 2000).

SLL students can learn these specific language skills concurrently with their development of basic vocabulary and conversational fluency. However, little direct transference is observed to other aspects of oral language proficiency such as linguistic concepts, vocabulary, sentence memory, and word memory (Geva, 2000; Kwan & Willows, 1998). Similar findings are reported by Verhoeven (2000) for minority language students in the Dutch context and by Lambert and Tucker (1972) for English-speaking students in French immersion programs.

### **Academic language proficiency**

This dimension of proficiency includes knowledge of the less frequent vocabulary of a language as well as the ability to interpret and produce increasingly complex written language. In the case of English as the school language, as students progress through the grades, they encounter far more low frequency words (primarily from Greek and Latin sources), complex syntax (e.g. passives), and abstract expressions that are virtually never heard in everyday conversation. Students are required to understand linguistically and conceptually demanding texts in the content areas (e.g.

literature, social studies, science, mathematics) and to use this language in an accurate and coherent way in their own writing.

Acquiring academic language is challenging for all students. For example, schools spend at least 12 years trying to extend the conversational language that native-speaking children bring to school into these more complex academic language spheres. It is hardly surprising, therefore, that research has repeatedly shown that SLL students, on average, require *at least* 5 years of exposure to the target language in school to catch up to native-speaker norms (Collier & Thomas, 1999; Cummins, 1981).

In addition to the complexity of the academic language they are attempting to acquire, SLL students must catch up to a moving target. Every year, native-speakers are making large gains in their reading and writing abilities and in their knowledge of vocabulary. In order to catch up to grade norms within 6 years, SLL students must make 15 months gain in every 10-month school year. By contrast, the typical native-speaking student is expected to make 10 months gain in a 10-month school year (Collier & Thomas, 1999).

All three aspects of language proficiency are important. However, policy-makers and the media frequently confuse them. Many SLL students who have acquired conversational fluency and decoding skills in the school language are still a long way from grade-level performance in academic language proficiency (Cummins, 2001; Krashen, 2001). Students who can “read” the target language fluently may have only a very limited understanding of the words they can decode. This reality becomes increasingly apparent as students encounter the more complex academic language of content matter in the later grades of elementary school. Chall, Jacobs & Baldwin (1990) label this phenomenon the *fourth grade slump*. The note:

Whereas the major hurdles prior to grade 4 are learning to recognize in print the thousands of words whose meanings are already known and reading these fluently in connected texts with comprehension, the hurdle of grade 4 and beyond is coping with increasingly complex language and thought. (1990, p. 45)

The fourth grade slump reflects the fact that neither “language proficiency” nor “reading ability” are unitary constructs. Reading comprehension does not develop automatically on the basis of decoding skills; similarly, academic language proficiency is largely unrelated to students’ conversational fluency in English or their knowledge of discrete language skills. A core component of academic language proficiency is vocabulary knowledge and the vocabulary load in the curriculum increases dramatically after the primary grades. The development of academic language proficiency, for both ESL and non-ESL students, requires that students *gain access to academic language* by means of extensive reading and also that they are supported in *harvesting the language* they encounter in literature and content area texts.

## **TEACHING THE LANGUAGE OF ACADEMIC SUCCESS**

Fielding and Pearson (1994, p. 62) highlight four instructional components that research suggests are strongly related to reading comprehension outcomes:

- Large amounts of time for actual text reading;
- Teacher-directed instruction in comprehension strategies;
- Opportunities for peer and collaborative learning; and
- Occasions for students to talk to a teacher and one another about their responses to reading.

Extensive reading is crucial for academic language development because less frequent vocabulary is found primarily in written text. In English this less frequent vocabulary derives primarily from Greek and Latin sources whereas the high frequency vocabulary has Anglo-Saxon origins. According to Corson:

“Printed texts provided much more exposure to [Graeco-Latin] words than oral ones. For example, even children's books contained 50% more rare words than either adult prime-time television or the conversations of university graduates; popular magazines had three times as many rare words as television and informal conversation” (1997, p. 677)

The research is unequivocal in showing strong relationships for both L1 and L2 learners between opportunities to read and development of vocabulary and reading comprehension abilities (e.g. Elley, 1991; Krashen, 1993; Postheltwaite & Ross, 1992). Research also supports the importance of explicit instruction in comprehension strategies and explanation of word meanings (Postheltwaite & Ross, 1992; Rand Reading Study Group, 2002). This research forms the basis for the *e-Lective Language Learning* program.

### **COMPUTER-SUPPORTED ACADEMIC LANGUAGE LEARNING: THE e-LECTIVE LANGUAGE LEARNING PROGRAM**

This section outlines the rationale underlying an approach to computer-supported language learning that uses target language text as input for learning. Comprehension of the text is facilitated for learners as a result of on-line dictionary supports built into the program. The dictionary supports can be provided in learners' first and second languages (L1 and L2). In addition, vocabulary building and grammar learning supports are incorporated. These supports represent *scaffolding* that enables the learner/reader to process the meaning of texts that otherwise would have been inaccessible. Any text in electronic form can be imported into the system and used as authentic input for target language learning.

The term *e-Lective* is meant to signify three central aspects of the system. First, the "e-" prefix operates in a similar way to the prefix in "e-mail" to indicate that the target language text is in electronic form. Second, the text-based nature of the system is signified by the "Lect" root which derives from the Latin *legere* - *to read* with cognates in many Romance languages such as *lecture* in French and *lectura* in Spanish, both meaning *reading*. Finally, the word "elective" signifies that learner options or choices are built into the system at many levels; for example, learners can choose which texts to read and they can self-regulate the type and degree of support they invoke while reading in the target language. The system is designed to provide the scaffolding of textual material necessary for second language learners to gain access to the curriculum or to target language texts and to *harvest the language* they encounter in those texts.

The system can, in principle, be applied in any language learning context. To illustrate its application, consider an immigrant high school student in Canada who is learning English as a second language. Let us suppose this student has been in Canada for two years. This student will usually have acquired reasonably adequate conversational skills in English but still be far behind grade expectations in academic aspects of English (e.g. reading, writing). For this student to catch up to grade expectations, he/she must get extensive access to the written text of the curriculum and also be supported in internalizing this language so that it can be used in his/her own writing.

The *e-Lective Language Learning* program is designed to support this process. The program is based on the premise that written text can serve as input for the language learning process.

Furthermore, the development of academic language proficiency *requires* that students get extensive access to, and be enabled to harvest, the language of academic text. As noted above, the low frequency and academic language vocabulary that becomes increasingly central to reading comprehension as students progress through the grades is found almost exclusively in written text. The prototype of the program has been developed with English as the target language but, in principle, the program can be used to support acquisition of any language for both school-age and adult learners.

The program has the following major features:

- Any text in electronic form (downloaded from the Internet, scanned in, or available on CD-ROM) can be imported into the program. Thus, teachers have the opportunity to select stories and expository texts that match their students' interests and cultural backgrounds rather than relying on one-size-fits-all texts and strategies.
- Students get one-click access to L1 and English dictionary support to facilitate understanding of the meaning of individual words and sentences.
- The program "remembers" the words that each individual student has clicked (unknown words) and provides individualized practice to students to assist them in learning this vocabulary. These practice exercises employ several varieties of receptive and productive cloze procedure and can be set at five levels of difficulty. In practice mode, immediate feedback is provided to students on the correctness of their responses. Thus, even beginning learners can experience success in understanding grade-level texts and acquiring the vocabulary of these texts.
- Students can demonstrate that they have learned previously unknown words by passing a "test" at difficulty level 3 or above (on the five-point scale). The tests employ the same cloze procedures used in Practice Mode but provide feedback only after completion of the entire test. The system tracks students' progress in transforming previously unknown words into "learned words." In this way, students are enabled to expand their academic vocabulary at their own pace and in the context of reading texts that are either relevant or intrinsically interesting to them. At the end of each month, for example, teachers can make statements such as: *Stavros read 8 texts during October containing 4,020 words. Of these words, 483 were originally unknown to him but, over the course of the month, he demonstrated that he had learned 400 of these new words. The 83 words that Stavros did not know and has not demonstrated knowledge of are listed below.*
- At the press of a button, students can identify *high frequency words*, *low frequency words*, and *academic words* in the text. Academic words are the most common words that occur across different academic disciplines. Thus, different kinds of words can be targeted by the student (or teacher). If there are high frequency words that students don't know, it is particularly important to acquire these words because their general utility value is greater than that of low frequency words.
- There is also a Grammar Mode in which students, at the click of a button, can identify the different parts of speech of all the words in the text (some teacher input is necessary here to make sure the computer gets it right). If students (or their teachers) wish, they can also carry out practice exercises focused on these parts of speech. We believe that it is important to help students demystify aspects of grammar for the simple reason that

knowing the functions of verbs, nouns, adjectives, and other parts of speech facilitates text comprehension and prediction of meaning.

- An environment is also provided in which students can carry out *language detective* work, exploring aspects of the meaning, form, and use of different words they choose. For example, students might explore the different meanings of the English word *cool* in advertisements. They can also research L1 equivalents of this kind of use. Or they might explore similarities and differences in the way Graeco-Latin origin words such as *revolution* are used in Social Studies and Science; for example, they could carry out some detective work on the meanings and functions of the prefix, root, and suffix of these words.
- Finally, an environment is created to support students' creative writing in response to texts they have read. Students are encouraged to develop an orientation of critical literacy in interpreting the text. Support is provided to enable students to probe issues such as whose perspective the text is written from and whose perspectives might have been omitted from the text.

### **UNDERLYING THEORY**

The theory underlying this system differs from (but also complements) current approaches to both conventional language teaching and multimedia design for language learning. Regardless of the emphasis in current approaches on structural versus communicative syllabus design, the starting point of both instruction and curriculum materials is *didactic*. The syllabus design of these programs incorporates pre-determined language structures or functions and vocabulary that the system is designed to teach. There is usually little flexibility to accommodate the learning styles and interests of individual learners – one size fits all. By contrast, in the e-Lective system, individual learners (or teachers) can choose the material to be read according to their interests or needs, thereby increasing the likelihood of strong motivation; learners also self-regulate the kinds of supports they invoke and the learning strategies that they themselves find useful. Access to first language dictionaries takes a matter of seconds rather than minutes, with the result that the flow of meaning is minimally interrupted. SLL students are enabled to read grade-appropriate academic content that previously was inaccessible.

A major focus of the program is on vocabulary acquisition for the simple reason that vocabulary knowledge is the core component of both academic language proficiency and reading comprehension. Nation and Coady (1988), in reviewing research on the relationship between vocabulary and reading point out that “vocabulary difficulty has consistently been found to be the most significant predictor of overall readability”. Once the effect of vocabulary difficulty (usually estimated by word frequency and/or familiarity and word length) is taken into account, other linguistic variables, such as sentence structure, account for little incremental variance in the readability of a text. They summarize their review as follows: “In general the research leaves us in little doubt about the importance of vocabulary knowledge for reading, and the value of reading as a means of increasing vocabulary” (p. 108). One example of the research demonstrating the extent to which vocabulary can be acquired from context is Nagy, Herman and Anderson's (1985) demonstration that the probability of learning a word from context after just one exposure is between .10 and .15. As learners read more in their second language, repeated exposure to unfamiliar words will exert an incremental effect on vocabulary learning.

The power of reading in promoting knowledge of the target language is supported in a wide variety of studies. Elley and Mangubhai (1983), for example, demonstrated that 4<sup>th</sup> and 5<sup>th</sup> grade students in Fiji exposed to a “book flood” program during their 30 minute daily English (L2) class in which they simply read books either alone or with the guidance of their teacher, performed significantly better after two years than students taught through more traditional methods. Elley (1991) similarly documented the superiority of book-based English language teaching programs among primary school students in a variety of other contexts.

## CONCLUSION

Most governments in industrialized countries, supported by business interests and parents, have placed a high priority on introducing ICT into their schools. The assumption appears to be that ICT is an integral part of the new economy of the 21<sup>st</sup> century and therefore it should be an integral part of the school systems that are supposed to prepare students for this new economy. There has been considerable discussion in some contexts regarding the wisdom of this direction. For example, in North America, critics have argued that there is little evidence that ICT has resulted in significant improvement in students’ overall school achievement and they point to the diversion of scarce resources from other subject matter, such as the arts and literature. However, these criticisms have had little impact and the introduction of ICT in schools gains momentum with every passing year.

Despite the increase in access to ICT in schools, there is still no consensus as to *how* computers should be used to support learning. For example, schools in affluent middle-class areas increasingly tend to use computers to support higher-order thinking through creative project work while those in low-income inner city areas still use computers predominantly to reinforce students’ mastery of basic skills through drill and practice activities.

I have argued in this paper that ICT can play a significant and positive educational role, but only if the pedagogical possibilities of ICT are clearly understood. ICT is minimally useful as a pedagogical tool when it is assimilated into a rigid top-down teacher-centered textbook-oriented curriculum. It does little more than the worksheets of old, at considerably greater cost. However, when ICT is integrated into a more dynamic and socially-transformative pedagogical orientation, it has enormous potential to promote academic language learning, thinking and problem-solving abilities, imagination, and affirmation and expansion of student identities. Unfortunately, current trends in many countries, particularly for schools serving low-income students, reflect the former one-size-fits-all pedagogical orientation rather than the more dynamic “knowledge generation” orientation associated with a pedagogy of collaborative critical inquiry.

The *e-Lective Language Learning* program illustrates the kind of support that ICT can provide for just one of the dimensions mentioned above, namely academic language learning. Unlike most didactic approaches to computer-assisted language learning, *e-Lective* does not come with any predefined content that it promises to teach. Instead, it invites teachers (or individual students) to choose content for reading that is relevant to their interests or goals. The program provides support for students’ understanding of these texts and for their acquisition and use of the vocabulary embedded in the texts. Supports for grammatical learning, exploring word meanings in depth, and creative writing are included but students and teachers are given the option of using or not using these resources. We envisage that future versions of *e-Lective* will be used to support sister class exchanges in which students will use their stronger language to communicate with the sister class and their partners will use the program to help them interpret the meaning of what the sister class has written. Thus, there would be a much more equitable exchange than is currently often the case where English dominates the exchange.

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