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English Language Learners and Technology: Applying Universal Design for Learning and the Sheltered Instruction Observation Protocol in the Evaluation of Literacy Support Software

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ENGLISH LANGUAGE LEARNERS AND TECHNOLOGY: APPLYING

UNIVERSAL DESIGN FOR LEARNING AND THE SHELTERED INSTRUCTION

OBSERVATION PROTOCOL IN THE EVALUATION OF LITERACY SUPPORT

SOFTWARE

A Project Report

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by

Susan M. Connolly

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ABSTRACT

ENGLISH LANGUAGE LEARNERS AND TECHNOLOGY: APPLYING

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The population of culturally and linguistically diverse (CLD) students in U.S. schools has been steadily increasing. These students do not experience equal educational opportunity in U.S. secondary schools. CLD students need to develop English literacy as well as content knowledge to attain equal educational opportunity. Teachers of CLD students need techniques and tools which support CLD students in mastering the content expected of secondary school students while acquiring English literacy.

The criteria for effective lesson design and delivery inherent in the Sheltered Instruction Observation Protocol (SIOP) and the criteria for designing curriculum without barriers to access inherent in Universal Design for Learning (UDL) are combined into a researcher-created assessment tool, the Literacy Support Software Evaluation Protocol (LSSEP). Nine software applications are evaluated for their effective use with CLD students. The LSSEP is made available for use on other literacy support software.

iii

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

CHAPTER I

INTRODUCTION

General Problem

The population of students in U.S. schools whose first language is not English has been steadily growing (National Clearinghouse for English Acquisition, 2003). These students enter the U.S. school system with a wide range of previous school experience at a variety of grade levels (Echevarria, Vogt & Short, 2004; Ruiz-de-Velasco & Fix, 2003). Culturally and linguistically diverse (CLD) students at the secondary school level spend most, if not all, of their school day in grade-level content area classrooms (Hudelson, Poyner & Wolfe, 2003; Harklau, 1999). An inadequate number of teachers are trained in teaching strategies that support English literacy development while teaching content to CLD students (Echevarria et al., 2004). Consequently, CLD students who lack the prerequisite language skills experience great difficulty understanding the academic language inherent in mastering content at the secondary level. Without literacy support these students rarely achieve sufficient literacy skills necessary to obtain educational success or parity with their native English-speaking peers (Thomas & Collier, 1997).

Literacy support software applications are commonly used to assist students who experience a variety of barriers to literacy development and to mastery of the curriculum. These applications could be capable of providing CLD students tools which support continued literacy development in grade-level content classrooms. The purpose of this project is to understand the effectiveness of literacy support software for CLD students at the secondary level.

1

Background of the Problem

In the ten-year period from 1993 – 2003 the rate of increase in the CLD

population was 65.03% as compared to the rate of increase for the K-12 population of

9.19% (US Department of Education, 2003). The English language proficiency of these

students varies greatly. First language literacy, a key component to developing literacy in

English as a second language, also varies greatly. Research shows that CLD students

typically require 4 to 6 and even up to 10 years to achieve the language proficiency

needed for academic success (Cummins, 1981; Thomas & Collier 1997).

Secondary students have little time to develop academic English language

proficiency. They also need to master content area curriculum in order to meet the ever-

growing demands of mandated testing in order to graduate from high school (Ruiz-de-

Velasco & Fix, 2000). Furthermore, though second language acquisition theories widely

accept the use of native language support for second language acquisition, studies show

that 24% of secondary students receive native language instruction compared to 48% of

elementary students (Kindler, 2002).

CLD students experience barriers to accessing the curriculum materials. Texts at

the secondary level are written at an academic language level beyond the academic

language proficiency of most CLD students, especially recent immigrants (Ruiz-de-

Valesco & Fix, 2000). Teachers and students face a difficult task when the curriculum is

presented in a format unintelligible to the student. Teachers need strategies that enable

CLD students to comprehend the curriculum while continuing to develop English literacy

proficiency (Echevarria et al., 2004). Two such strategies are Universal Design for Learning (UDL) and sheltered instruction.

UDL is a research based approach to reducing barriers to students' access to the curriculum (Rose & Meyer, 2002). The term universal design originates from the field of architecture (Meyer, Rose & Hitchcock, 2005). The objective of universal design is to create accessible structures by considering the wide range of access needs for all individuals. Considering the potential barriers to access during the design phase enables the resulting physical structure to be accessed by a wider range of individuals.

The concept of universal design is applied to educational settings in UDL (Meyer, et al., 2005; Rose & Meyer, 2003). The theoretical principles of UDL advocate that curriculum is chosen and classroom activities are designed to reduce barriers for students of diverse backgrounds, including language diversity. Rather than one textbook or source of content information, the curriculum incorporates a variety of sources. These sources may include, but are not limited to, electronic text, printed material, video, audio, and Internet resources. Flexible curriculum materials reduce the need for teachers to modify the curriculum for English learners (Rose & Meyer, 2002; Meyer et al., 2005; Council for Exceptional Children, 2005).

Sheltered instruction is an approach to teaching English learners content concepts while providing English literacy support (Echevarria et al., 2004). By using a variety of pedagogical strategies, such as concept modeling, graphic organizers, realia, and modified language, teachers enable English learners to continue to develop academic language skills while developing content area knowledge. The Sheltered Instruction

Observation Protocol (SIOP) provides an analysis tool of effective lesson design and delivery strategies for teachers of CLD students (Echevarria et al., 2004).

Research shows the effectiveness of sheltered instruction for CLD students (Echevarria et al., 2004). Research also shows the effectiveness of UDL in reducing barriers to the curriculum for diverse learners (Meyer et al., 2005). Literacy support software applications, somewhat common in special education classrooms, are less common in grade-level content area classrooms where the vast majority of CLD students at the secondary level are educated. In this study, the theoretical concepts inherent in UDL and the pedagogical guidelines for sheltered instruction inherent in the SIOP provide a framework for evaluating literacy support software in relation to CLD students' academic needs.

<div align="center">Theoretical Framework</div>

Thomas & Collier (1997) document a complex, integrated relationship between the sociocultural experiences of learners and their cognitive, academic, and language development. The Prism Model (Thomas & Collier, 1997) outlines the relationship between these four equal areas of development and provides a framework for considering the needs of CLD students. Cognitive and academic development are particularly interrelated in the school context and are considered together.

<div align="center">*Cognitive and Academic Development*</div>

Cognitive development in children is a naturally occurring process which begins at birth and proceeds beyond the formal school years. Academic development consists of all the content area knowledge and skills attained at each grade level throughout a

student's educational experiences. As the academic work advances through the grade levels, the cognitive level of the concepts also advances (Thomas & Collier, 1997).

According to Vygotsky, language and action are mediation tools used for learning (Wink & Putney, 2002). Language, a cultural heritage acquired from our interactions with others, is a dynamic tool which is used actively in the learning process. Students use language to interact with others and in doing so alter their thinking as well as develop their language and affect their actions (Wink & Putney, 2002).

The integral connection between language and thought has important implications for the cognitive and academic development of CLD students. Based upon Vygotsky's (1978) perspective, it is important for CLD students to be able to interact with other students, beyond the barriers that may exist due to the language differences between them, in order to support their learning and language development.

Students are unique individuals. While this over-simplified statement is easily accepted, it can be argued that its complexity is not always grasped. Recent brain research reveals "that there are no 'regular' students. The notion of broad categories of learners – smart, not smart, disabled, not disabled, regular, not regular – is a gross oversimplification that does not reflect reality. By categorizing students in this way, we miss many subtle and important qualities and focus instead on a single characteristic" (Rose & Meyer, 2002, p. 38).

Vygotsky's concept of the Zone of Proximal Development (ZPD) adds further understanding to the uniqueness of learners. The ZPD is the difference between a student's actual developmental level and the potential developmental level which the

student can achieve with assistance from an adult or more capable peer (Vygotsky, 1978). Students learn best when activities are directed within their ZPD (Wink & Putney, 2002). Providing CLD students with learning opportunities targeted within the ZPD leads the students' development and "makes it possible to assume that good teaching can lead to good learning, which in turn can lead to more development" (Wink & Putney, 2002, p.95). Addressing CLD students' unique learning needs by targeting their ZPD, when viewed through the lens of Vygotsky's theories, becomes an integral part of supporting students' cognitive and academic as well as literacy and language development.

Language Development

Language development consists of all associated skills of oral and written language systems which include vocabulary, syntax, morphology, semantics, pragmatics, discourse and paralinguistics (Thomas & Collier, 1997). Attention to language development in students' first and second languages is integral to their academic and cognitive development. (Thomas & Collier, 1997; Cummins, 2001).

Krashen (1982) proposes a distinction between the learning of a language and the acquisition of a language. Learning a language is the result of direct instruction and consists of knowledge of the rules and grammatical structure of the language. Acquisition is a subconscious process which results from naturally occurring opportunities for meaningful communication. According to Krashen (1982), language acquisition progresses in a natural order.

Understanding the difference between learning and acquiring a language has important implications for the education of CLD students. CLD students' language

proficiency will develop as attention is given to acquisition of the language and the order in which it is acquired; CLD students need much more than a focus on the grammar and structure of the English language (Krashen, 1982; Echevarria et al., 2004; Thomas & Collier, 1997).

The academic language needs of CLD students are often overlooked (Cummins, 1979). CLD students who have acquired sufficient English to become proficient in using English in social settings are often thought to be equally proficient in academic settings. According to Cummins (2001), social language skills, commonly referred to as Basic Interpersonal Communication Skills (BICS), are more contextually embedded and less cognitively demanding than language used in academic settings, referred to as Cognitive Academic Language Proficiency (CALP). The content-specific vocabulary and processes in CALP consist of a more complex skill level of language use and require instruction to master (Cummins, 1979). Attention to the development of both types of language is important for CLD students. Evaluating students or determining programming needs based upon BICS alone results in students who lack the requisite academic language skills needed for success in secondary content classrooms (Freeman, Freeman & Mercuri, 2005; Echevarria et al., 2004; Cummins, 2001; Chamot & O'Malley, 1994).

Sociocultural Development

The Prism Model developed by Thomas & Collier (1997) states that CLD students' academic, language, and cognitive development are affected by the socio-cultural experiences of their lives, not only in the instructional classroom but also in the school and in the larger community. Vyogostky asserts that learning occurs through

students' active interactions with others (Wink & Putney, 2002). CLD students' language development is affected by factors such as teacher-student as well as student-student interactions. CLD students benefit from educational experiences which create a supportive sociocultural environment for all students (Thomas & Collier, 1997).

<div align="center">Project Objective</div>

The academic success of CLD students educated in U.S. schools is dependent upon attention to each of the factors outlined above. This project used these concepts to evaluate literacy support software applications and their applicable use for CLD students.

<div align="center">Methodology</div>

The researcher used the criteria for effective lesson design and delivery from the SIOP and the theoretical framework for flexible curriculum design from UDL to create an assessment tool. The Literacy Support Software Evaluation Protocol (LSSEP), created in Microsoft Excel, consists of a series of questions. The LSSEP was applied to nine literacy support applications.

<div align="center">Remainder of the Project</div>

The concepts introduced in Chapter I of this project will be further developed and explored through a review of the literature in Chapter II. Chapter III discusses the procedure used to develop the LSSEP, delineates the relationship between the criteria and the LSSEP, and explains how the LSSEP is used. Chapter IV is a description of the software applications evaluated in this project and a discussion of the findings. Chapter V discusses the implications of this project for CLD students and their teachers as well as

outlines further steps which could be taken in using the LSSEP and the literacy support software applications for CLD students in secondary content classrooms.

Definition of Terms

Activity based learning: Students interact with content concepts through a wide variety of computer-based interactive tasks. Examples include creating talking, animated stories or moving objects on the screen to complete tasks. Content concepts can be developed, reinforced, or practiced throughout the activity.

Animation: Graphic objects on screen appear to move, change position or size, vibrate, or in some other fashion give the impression of movement.

Embedding: Teachers can place links, notes, voice recorded messages, and visual or auditory prompts into text or activities. In some software, these embedded objects, notes, or links show up automatically and in other software embedded objects can be hidden or revealed with simple mouse or on-screen button clicks.

Portable document file (PDF): A PDF (appears as title.pdf) is a document file that displays all the elements of a printed document as an electronic or digital image. Specific software is required in order to access PDF files. Free software to access PDF files, such as Acrobat Reader, can easily be downloaded.

Rich text files (RTF): RTF (appears as title.rtf) refers to document files that can be easily exchanged between different text-handling applications and platforms including word processing software. Most formatting, such as font and margins, are maintained.

Speech recognition (speech-to-text): Speech recognition is used to convert spoken words into printed text. Speech recognition requires a computer with sufficient

processing capabilities, a microphone, and advance preparation with the computer to create a voice file so that the computer can identify the individual vocal patterns of the speaker.

Text reader (text-to-speech): Text readers use speech synthesis technology to produce human like voices which speak text as it appears on the screen.

Voice file: A voice file is a collection of the individual vocal patterns of a speaker. It is created when the user trains the computer during the preparation phase for speech recognition. Typically, the speaker is asked to read selections into a microphone while the computer creates the voice file.

Word prediction: Word prediction is a feature which supports students as they write on the computer by displaying a list of word choices. The list changes as each letter is typed allowing for greater specification of the word the student is seeking. When the desired word appears the student can select the word and it will automatically be inserted into their writing.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Students educated in the U.S. school system are entitled to a quality education, regardless of their background, abilities, culture, or first language. As the population of culturally and linguistically diverse (CLD) students continues to rise, schools systems face ever increasing challenges of providing equal educational opportunity for all students.

CLD students benefit from specialized teaching approaches which enable them to obtain a quality education. Most CLD students at the secondary school level spend most if not all of their day in content classrooms if they are not in isolated ESL classrooms (Hudelson et al., 2003;Harklau, 1999). Not enough content teachers are trained in effective methods for teaching CLD students (Echevarria et al., 2004). CLD students educated in content classrooms with teachers not trained in effective techniques to meet their needs suffer low achievement in comparison to their native English-speaking peers (Thomas & Collier, 1997).

Content classroom teachers need resources and training specific to teaching CLD students. One source of effective resources is appropriate technology (Padrón & Waxman, 1996). Other resources include the SIOP and UDL. This project provides an evaluation of nine literacy support software applications which have been analyzed according to the principles of UDL and the SIOP.

Demographics

The U.S. Department of Education collects data annually from State Educational

Agencies (SEAs) which reflect the number of students with limited English proficiency

(LEP). Using this data, Kindler (2002) reported that the number of LEP students from the

1990 – 1991 school year through the 2000 – 2001 school year grew approximately 105%.

For that same time period the general school population grew 12%.

Not all of these CLD students are immigrants; 10% are third generation U.S.

citizens (Ruiz-de-Velasco & Fix, 2003). CLD students come to U.S. schools with a wide

range of previous academic experience and first language literacy (Echevarria et al.,

2004; Ruiz-de-Velasco & Fix, 2003). Many students, especially teens, have interrupted

schooling experiences which add to the challenges and demands of a high school

education in a new language. According to Hewlett-Gómez & Solíz (1995), instruction

typically consists of basic oral English development with very little attention to the

students' academic and literacy needs. Consequently, immigrant teens experience a very

high drop out rate (Fry, 2003; Ruiz-de Velasco & Fix, 2003).

Placement and Services

Though CLD students benefit from specialized instructional methods, few

secondary students receive such instruction (Hudelson et al., 2003). Programs which

incorporate the students' first language are uncommon at the secondary level (Kindler,

2002). SEA reports indicate that 24% of LEP high school students experience native

language incorporated into the language of instruction (Kindler, 2002). Only 12.5% of

teachers of CLD students have more than eight hours of professional development

regarding teaching CLD students (Herrera & Murry, 2005). Furthermore, CLD students

are over-represented in special education classes due to difficulties in distinguishing

second language issues from cognitive, developmental, or language issues (Brown,

2004). The lack of programming designed according to the needs of CLD students and

the inconsistency of the programming that intends to serve the needs of CLD students

results in an inequity of educational opportunity throughout the U.S. school system

(Freeman et al., 2005).

<center>Valuing Diversity: An Additive Understanding</center>

A recurring theme throughout the literature is the importance of viewing linguistic

diversity as a positive quality that CLD students bring to classroom environments.

(Brause & Mahyer, 2003; Herrera & Murry, 2005; Brown, 2004; Crawford, 2004;

Thomas & Collier, 1997). Learning a second language while maintaining a

developmentally appropriate level of literacy in a student's first language constitutes an

additive understanding of language acquisition; children acquire a second language

without cost to their first language development. Additionally, valuing the multilingual

and multicultural perspectives of CLD students creates opportunities for greater

enrichment of all students' educational experiences (Herrera & Murry, 2005).

Utilizing students' first language is an important aspect of CLD students'

education. Students educated at least through the elementary school years in both their

first language and English may exceed the academic performance of their native English-

speaking peers (Thomas & Collier, 1997). Dual language programs, whose goal is

bilingualism and biliteracy for all students and which consist of a mix of native English-

speaking students and CLD students, close the achievement gap for CLD students and

create enhanced achievement outcomes for all students in the program (Thomas &

Collier, 2004 as referenced in Freeman et al., 2005). The lack of dual language programs

at the secondary level increases the need for content teachers as well as sheltered

instruction teachers of CLD students to create classroom environments, curriculum, and

activities which affirm and value the diversity of language, culture, and background of

CLD students. Such environments seek to enrich student's lives and their educational

experiences rather than remediate (Freeman et al., 2005; Thomas & Collier, 1997).

<div align="center">Content, Instruction, and Programming</div>

CLD students share common educational needs. For the purposes of this project,

these needs are organized into the following categories: culturally responsive teaching

and curriculum, language and literacy development, academically and cognitively

appropriate content, first language (L1) development as support for second language (L2)

development, and appropriate and effective programming. While each of these categories

will be considered individually, it is important to recognize that the categorical

separations are for the purposes of academic discussion; a child's educational needs

consist of more than the sum of the individual parts.

<div align="center">*Culturally Responsive Teaching and Curriculum*</div>

The cultural backgrounds that students bring to school influence the way they

understand and interpret much of the daily happenings in the classroom. Futhermore,

teachers' ethnocentric views of culture and education can add to the challenges CLD

students experience (Ball & Farr, 2003). Basic assumptions regarding the

appropriateness, or lack thereof, of making eye contact, speaking for another person, or learning to trust one's own sense of reality and understanding of truth may seem appropriate from one cultural perspective but can be viewed quite the opposite from another (Delpit, 1995). Teachers should activate and access CLD students' prior knowledge and background experiences as well as affirm their cultural knowledge and experiences (González, Moll & Amanti, 2005; Hewlett-Gomez & Solis, 1995). Teachers and students sharing and negotiating perspectives and understandings of content as well as class environment live the multicultural education experience in a profound and real way (Cummins, 2001).

Curriculum materials should be sensitive to the diversity of cultural experiences and perspectives present in the community, the larger society of the U.S., and of the world (González et al., 2005; Delpit, 1995). The challenge to engage in the tasks of learning is even greater for CLD students when their own background and experiences are undervalued or even demeaned by the curriculum materials they encounter in the classroom (Cummins, 2001). Effective teachers know that student motivation is enhanced in an environment that respects and supports the students' cultural and ethnic heritages (Herrera & Murry, 2005).

Language and Literacy Development

Knowledge of English is fundamental to school success. This includes all four communication skills; listening, reading, writing and speaking (Butler-Pascoe & Wiburg, 2003; Hewlett-Gomez & Solis, 1995). However, many content teachers fail to realize the importance of developmentally appropriate knowledge of academic English as a

prerequisite skill to attaining content knowledge standards (Echevarria et al., 2004). CLD

students will succeed in acquiring language and content knowledge provided they receive

context and linguistic support while presented with cognitively challenging material

(Cummins, 2001; Hadley, 2000). While many states now require that teachers working

with CLD students have appropriate training, many content teachers still do not

understand the need to attend to the language and literacy needs of CLD students (Butler-

Pascoe & Wiburg, 2003) and unknowingly overlook the importance of the language

needs of CLD students in their content classrooms (Short & Echevarria, 1999).

Academically and Cognitively Appropriate Content

The literature indicates that academic content and language must be developed

concurrently rather than sequentially (Cummins, 2001; Ruiz-de-Velasco & Fix, 2000;

Echevarria et al., 2004; Thomas & Collier, 1997). Cummins (2001) makes the point that

the cognitive level of challenge for the student must be developmentally appropriate.

Providing students with only low level or watered down cognitive material or language-

only learning tasks slows down the students' cognitive and academic growth leaving

them unable to successfully catch up to their peers (Thomas & Collier, 1997). It is

important for teachers to present developmentally and cognitively appropriate and

challenging content to CLD students while continuing to provide the supports needed for

success (Cummins, 2001).

L1 Development Support for L2 Development

A landmark study conducted by Thomas & Collier (1997) concurs with previous

studies as to the importance of developing a child's literacy skills in his or her first

language. A common level of language proficiencies is shared between L1 and L2 and allows the transfer of skills from one language to another (Cummins, 1994). These common skills are referred to as the Common Underlying Proficiency Model of Bilingual Proficiency (CUP). The literature strongly recognizes the importance of L1 literacy skills as support for L2 literacy development (Collier, 1987; Collier & Thomas, 1989; Cummins, 1976, 1981, 1994; Dulay & Burt, 1980; Duncan & De Avila, 1979; Skutnabb-Kangas, 1981; Thomas & Collier, 1997).

Effective Programming

The question of how best to educate CLD students is a well researched topic (see Hudelson et al., 2003, for a review of the literature). Thomas & Collier (1997) discuss the long term achievement patterns for CLD students who enter U.S. kindergartens without English proficiency and continue in the U.S public school system through the 12th grade. Based upon this study of quality programs in various regions throughout the U.S., the only CLD students who emerge from the U.S. school system above the 50th percentile on standardized tests in reading English when measured at the 11th grade are those who have been educated in two-way bilingual programs (61st percentile) and those who have been educated in one-way developmental bilingual programs with content ESL support (52nd percentile). All other program models result in standardized test scores ranging from the 24th percentile to the 40th percentile. These are the CLD students educated in what can be considered the best-case scenario: the U.S school system for all 13 years.

The entire school bears the responsibility for educating the CLD population within the school, not just the ESL trained teachers (Cummins, 2001). At the secondary

level culturally responsive teaching and curriculum, language and literacy development,

academically and cognitively appropriate content, L1 support for L2 development, and

appropriate and effective programming, along with emphasis on learning strategies

(Chamot & O'Malley, 1994) need to be included in every classroom in which a CLD

student is educated.

Content, Instruction, and Programming: Conclusion

Given the tendencies, as outlined in the literature, for secondary CLD students to

be educated in environments without adequate attention to the cultural, literacy, content,

and language needs unique to CLD students in U.S. schools, it is possible to conclude

that CLD students do not experience equal educational opportunity. Educators and

educational systems share in the responsibility to develop new approaches to educating

CLD students which attend to their language, literacy, academic, cognitive, and

sociocultural developmental needs (Falits & Wolfe, 1999).

Theoretical Framework

Prism Model

The Prism Model, as developed by Thomas & Collier (1997), demonstrates the

need to address the academic, cognitive, language, and sociocultural development needs

of CLD students. The Prism Model provides a framework for understanding the various

theoretical considerations of this project.

Sociocultural Development

According to the Prism Model (Thomas & Collier, 1997), the sociocultural

processes in all aspects of the students' lives affect, both positively and negatively, the

ongoing natural development of the students' academic, cognitive, and language abilities. The complex and interdependent relationship of these factors directly affects students' educational success. Socioculturally supportive environments are key to successful first and second language and literacy development (Thomas & Collier, 1997).

According to Vygotsky, language and action are the tools of learning (Wink & Putney, 2002). Language is a complex process which humans use to interact with others. We actively use language which changes our thinking and which results in changes to our language and to our learning.

This complex interaction of language, action, and thought holds powerful implications for educating CLD students. If, as Vygotsky asserts, the interactive use of language with others is the tool for learning, then supporting CLD students' in their ability to use language interactively with others is vitally important. The importance of interactions between students and between students and teachers in socioculturally positive and safe environments is upheld in the literature (Cummins, 2001; Echevarria et al., 2004; Herrara & Murry, 2005; Freeman et al., 2005; Richard-Amato, 1996; Thomas & Collier, 1997).

Language Development

Language development in the second language is impacted by language development in the first language (Cummins, 1994). Optimum programming supports a student's literacy development in the first language to a level equal to the English development level of their native English-speaking peers (Thomas & Collier, 1997).

Krashen (1982) proposes two distinct systems involved in language performance. Learning a language results from direct instruction and constitutes knowledge about the rules, structure, and vocabulary of the language. Acquiring a language is a subconscious process which takes place when one is exposed to authentic meaningful communication in the target language. Authentic meaningful communication results from naturally occurring settings of communication with a speaker of the target language. According to Krashen, the order in which language is acquired is a natural progression, unique in some aspects to each individual, but common in its general order of realization (Krashen, 1982). It is important to attend to the development of both systems as these two independent systems interact during communication. The acquisition system guides communicative output while the learning system acts as a monitor or editor of the output (Krashen, 1982).

In order for a learner of a language to be successful at acquiring a target language, the learner must be able to comprehend the written and oral language encountered (Krashen, 1982). The optimum level of comprehensible input is explained in Krashen's Input Hypothesis theory by the expression $(i + 1)$. Given the student's current level of proficiency (i) the student will continue to progress in language acquisition when the input occurs at a level slightly beyond (+ 1) the student's current competency level. Input which is more than slightly beyond the student's current level is largely unintelligible and does not result in language proficiency growth. Input which is at or below the student's current level provides no challenge and also does not result in language proficiency growth. CLD students in content area classrooms not experiencing instruction or

curriculum materials targeted at the $i + 1$ level will experience either frustration at their

inability to understand or lack of adequate challenge to produce continued growth in

language proficiency (Krashen, 1982). Both scenarios fail to support the language and

thereby the literacy development these students need for educational success.

Cummins (1979) provides a theoretical perspective of language skills according to

the context of the use of the language. The two concepts, Basic Interpersonal

Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP),

are not separate categories but describe differences as well as degrees of complexity.

BICS enable communication on a personal level. BICS include the language

needed to discuss everyday activities, functions, and topics. Most children have mastered

these skills in their first language by the time they enter kindergarten. BICS support

social interactions and are largely acquired through naturally occurring interactions

during childhood.

CALP includes the academic language of school. The linguistic skills inherent in

CALP are more complex and require specific instruction in order to be mastered

(Cummins, 1979). CALP includes content-specific language and process skills. Students

may appear to be competent in English when measured by their BICS but function far

behind their peers when measured by their CALP. Secondary content area teachers need

to be aware of the difficulty the CLD students may experience with the academic

language and processes of the class and be prepared to provide support as needed.

Further distinctions are made between the contextual and cognitive demands of

language. Cummins (1994) utilizes the concept of the intersection of two continua along

horizontal and vertical axes to make these distinctions. The horizontal axis represents the continuum from context embedded language to context reduced language. Context embedded language occurs in communicative settings where gestures, facial expressions, and other situational cues are available to the participants for use in negotiating meaning. Context reduced language occurs in communicative settings where few situational cues exist and the participants must rely on their knowledge of language itself to discern meaning.

The vertical axis represents the continuum from cognitively undemanding language to cognitively demanding language. The upper end of the continuum represents the cognitively undemanding language skills inherent in mostly automatic communication and which require little cognitive involvement to execute. The lower end of the continuum represents the cognitively demanding language skills. These are the language skills inherent in academic as well as other settings which require thought and which are not automated.

Communication occurs in any quadrant represented by this framework. Teachers of CLD students must consider the language development needs of their students when asking for cognitively demanding as well as context reduced communication tasks; CLD students likely require scaffolding of such tasks (Echevarria et al., 2004; Chamot & O'Malley, 1994; Freeman et al., 2005).

Academic and Cognitive Development

Academic development comprises all the content knowledge and skills acquired throughout a student's education. Since academic concept knowledge transfers from a

student's first language to a second language, it is most effective for students to continue

developing academic skills in their first language while also developing academic skills

in a second language (Cummins, 1994; Thomas & Collier, 1997).

Cognitive development is a naturally occurring process in every child. It is vital

that cognitive development be supported in a student's first language through the

elementary school years (Thomas & Collier, 1997). Cognitive development is a continual

focus of every child's education and should match the abilities of the individual child. It

is important for CLD students to receive academic content which supports their cognitive

development; it is inappropriate for CLD students to be given simplistic or less

challenging content just because of the language barrier (Faltis & Wolfe, 1999;

Cummins, 2001; Echevarria et al., 2004; Freeman et al., 2005).

Vygotsky (1978) makes a distinction between the functional level of mastery, or

the actual developmental level, of an individual student and the potential level of

mastery, or the potential developmental level. The actual developmental level is

identified by determining those tasks or skills that students can accomplish on their own.

The actual developmental level is viewed as developmental functions that have matured

(Vygotsky, 1978). The potential developmental level is identified by determining those

tasks or skills that students can accomplish with guidance from an adult or more capable

peer. The potential developmental level is, according to Vygotsky, the prospective

development that students are working toward, with support, which will one day be

realized and thereby identified as the actual developmental level.

Vygotsky (1978) asserts that instruction should be targeted between the actual and

potential developmental levels for an individual. Vygotsky (1978) calls this the Zone of

Proximal Development (ZPD). Instructing students outside of their ZPD results in either

lack of challenge, potentially leading to disinterest because the content is already

mastered and therefore no learning can take place, or in frustration because the content is

beyond the student's ZPD (Wink & Putney, 2002). The ZPD, by definition, encompasses

those skills, concepts, and abilities a student is in process of mastering with guidance

from the teacher or more advanced peer (Vygotsky, 1978). Students asked to deal with

content or language which is outside of their ZPD face little chance of mastering the

content or skill (Council for Exceptional Children, 2005; Wink & Putney, 2002).

The theories of Vygotsky create an interesting perspective on the situation

secondary CLD students face in content area classrooms. As has been established in this

review of literature, few secondary CLD students have the language and literacy skills

necessary for success in the content area classrooms without support. These students,

most especially those who are recent immigrants, face the difficulty of attempting to learn

content while using a second language not yet mastered. For these students, their ZPD

encompasses those language and literacy skills they have already mastered and those they

are in process of developing. Considering that their native English-speaking peers operate

within a different language ZPD, or even multiple different zones, and that content

classrooms likely target the ZPD of the native English-speaking students, CLD students

will need some assistance or support to bridge the differences between what they can do

or are working toward mastering and the language skill level of the class content

(Freeman et al., 2005; Echevarria et al., 2004; Chamot & O'Malley, 1994).

Theoretical Framework: Conclusion

CLD students are best educated in supportive environments with cognitively

appropriate content that is designed to address both the students' ZPD and level of

comprehensibility. Effective instruction of CLD students recognizes the students' need

for interaction and communicative use of language as well as the need for first language

support for developing second language literacy equal to a level of the students' native

English-speaking peers. Effective instruction also considers the natural progression of

language skill, supports students in that process, and provides tools for addressing the

differences between the students' proficiency levels, their ZPD, and the expectations of

the classroom. The purpose of this project is to investigate the effectiveness of literacy

support software as one such tool.

Sheltered Instruction

Sheltered instruction is an approach to teaching CLD students which includes

focus on grade-appropriate content and academic challenge while promoting and

supporting English language development (Reed & Railsback, 2003; Echevarria et al.,

2004). Sheltered instruction can be utilized in any program setting for CLD students but

is of particular value for CLD students in content classrooms. Scaffolding tools, which

are the contextual and language supports needed to make the content comprehensible, are

an important part of sheltered instruction (Cummins, 2001; Echevarria et al., 2004). CLD

students in content classrooms benefit from teachers' use of a variety of scaffolding tools

(Chamot & O'Malley, 1994; Echevarria et al., 2004).

Sheltered Instruction Observation Protocol

The Center for Research on Education, Diversity & Excellence (CREDE)

conducted a seven-year study (1996-2003). The purpose of the study was to identify key

practices of sheltered instruction and to develop a model of sheltered instruction which

could be utilized to train teachers in effective means of working with CLD students. The

SIOP model is the result of that study.

Developers of the SIOP incorporated field testing and teacher feedback into the

current form of the SIOP model (Short & Echevarria, 1999). According to Echevarria et

al., (2004), the SIOP model is "grounded in the professional literature and in the

experiences and best practice of the researchers and participating teachers who worked

collaboratively on developing the observation instrument that codifies it" (p. 13).

The SIOP model provides teachers with a framework for lesson design and

delivery within any content area. The SIOP model consists of 30 items organized around

three main categories: lesson preparation, instruction, and review and assessment. Within

each category, there are several principles.

Within the category of preparation, teachers consider language objectives in

addition to the content objectives for the lesson. Teachers using the SIOP model also

consider supplementary materials that will support student comprehension, meaningful

activities that will integrate the lesson concepts, and any adaptation of the content to

address individual student proficiency levels.

Within the category of instruction, the principles are further subdivided into building background, comprehensible input, strategies, interaction, practice, and lesson delivery. Each of these principles incorporates specific criteria teachers should include when using the SIOP model. For example, under building background teachers should make explicit links between the lesson content and the students' background experiences and prior learning. Key vocabulary, academic language, and critical concepts need to be emphasized in a variety of ways. Teachers also should implement various learning strategies and incorporate scaffolding techniques for the concepts and processes involved in the lesson. Consideration for the various grouping configurations is important as well, and teachers should consider the CLD students' needs to interact with one another, with native English-speaking peers, and with the teacher in various capacities.

The third major category, review and assessment, includes review of the key vocabulary and concepts in the lessons. It is also important for CLD students to receive regular feedback and to experience authentic, ongoing assessments.

The principles in the SIOP model reflect the research and the field tested results regarding effective elements for teaching CLD students. The principles for effective lesson design from the SIOP model are incorporated into the LSSEP created for this project.

Universal Design for Learning

The literature indicates consensus regarding the need for CLD students to have access to the curriculum in order to achieve academic success (Wright, 2005). UDL is a concept of designing curriculum, activities, and assessments for access by all students.

The Center for Applied Special Technology (CAST) first started using this term in the

early 1990's (Rose & Meyer, 2002). The concept of UDL originates from architectural

design of buildings and environments for universal access.

The term universal design was first used by Ron Mace at North Carolina State

University and has since impacted the design of buildings to accommodate the widest

range of access needs (Meyer et al., 2005). Applying universal design, architects discover

that many more individuals benefit from the consideration of access needs than just those

the design set out to accommodate. For example, creating ramps for people who use

wheelchairs to access buildings also creates benefits for other people for whom stairs

present a barrier to accessing the building, such as parents with baby strollers and

individuals on crutches or with limited mobility. It is easier to create a building with

access accommodations designed into the structure rather than modifying the building at

a later date. From this discovery, buildings and environments are now designed from the

beginning with access needs in mind for a wide range of individuals. This concept is

applied to education in UDL; curricular design rather than curricular modifications

(Delaware Department of Education, 2005; Abell, M. & Lewis, P., 2005; Meyer et al.,

2005; Rose & Meyer, 2002; Council for Exceptional Children, 2005).

Research Basis for Universal Design for Learning

Research in how the brain learns provides the foundation for UDL. Three

networks of neural connections within the brain are involved in learning; recognition

networks, strategic networks, and affective networks. These three networks are involved

in recognition of information to be learned, application of strategies for processing the information, and engagement with the learning task (Rose & Meyer, 2002).

Recognition networks are large neural networks of connections within the brain that allow us to identify and interpret patterns (Wallis & Bülthoff, 1999). We understand the symbols and the images we see. We construct understanding from the sensory information our brains take in. In education recognition networks are those areas of the brain where information is processed, patterns are recognized, and understanding occurs (Rose & Meyer, 2002).

Strategic networks are the regions within the brain which work together to plan, produce, and monitor any cognitive or physical activity. In education strategic networks are employed for all types of learning tasks, skill development, and demonstration of learning (Chamot & O'Malley, 1994; Echevarria et al., 2004; Rose & Meyer, 2002). The multiple steps required to execute any task involve the brain's strategic networks.

The affective networks involve the brain's response to and evaluation of all activities. The affective networks control our responses to situations we encounter. Consideration for students' environmental preferences and unique learning differences can make a difference in student engagement and direction of their own learning (Diáz-Rico, 2004; Rose & Meyer, 2002). Teachers who consider students' affective networks create an environment conducive to students choosing to engage in the learning.

Principles and Concepts of Universal Design for Learning

The research-based principles of UDL provide a framework for identifying potential barriers to learning. Curriculum, activities, and assessments are designed from

the beginning to reduce barriers that may occur due to the materials, modes of

presentation, or means of demonstrating learning. Content must remain cognitively

challenging and appropriate. Flexibility is a key concept. By designing curriculum with a

broad range of student abilities in mind, there is less need to create accommodations or

changes for individual students (Delaware Department of Education, 2005; Meyer et al.,

2005; Rose & Meyer, 2002).

Curriculum as traditionally presented, especially in the secondary schools, creates

barriers for many types of students (Faltis & Wolfe, 1999; Freeman et al., 2005). Relying

on printed textbooks as the major source of content is one such barrier. CLD students

may not be able to access the content if they are expected to read and comprehend the

textbooks typically found in the secondary school content classroom; the academic and

content-specific language will present barriers to many CLD students (Rose & Meyer,

2002; Cummins, 2001). CLD students who are attempting to learn the academic language

of school while simultaneously acquiring content knowledge experience problems with

written English (Echevarria et al., 2004).

Utilizing UDL in designing curriculum allows for a variety of representations of

the content students are expected to learn. Digital textbooks, audio, video, print materials,

graphic representations, photos, etc. are all examples of tools for presenting content in

flexible ways. These flexible means of representation allow for access to the content by a

much greater array of students than does utilizing only one source for the content, i.e. the

textbook. Specific teaching techniques to support recognition learning include providing

multiple examples, highlighting the critical features of the concept, providing multiple

representations through a variety of media, and providing flexible means for supporting the students' background knowledge (Rose & Meyer, 2002; Echevarria, et al., 2004).

Once students have access to the curriculum, they then can begin the process of interacting with the content in order to learn the material. Learning strategies are key components for acquiring content (Echevarria et al., 2004; Chamot & O'Malley, 1994). This then leads to demonstration of learning in some fashion. The question of how to interact with the content and practice skill development is one that teachers ask with the preparation of every lesson.

UDL advocates incorporating flexible options and allowing students to interact with the content and choose processing strategies most suited to their unique needs. Again, flexibility in choice of materials, means, media, and learning strategies provides multiple avenues for supporting strategic learning. Specific teaching techniques include providing flexible models of the desired skill performance or product outcome, providing opportunities to practice with supports or scaffolds, providing ongoing relevant feedback while teaching students to self-monitor, and offering flexible choice for demonstrating the acquired skill or learning (Rose & Meyer, 2002; Echevarria et al., 2004).

Student engagement is a major factor in learning. Students who are interested in the content and the activities surrounding that content are more likely to engage in the learning process. Teachers can support student engagement by offering choices of content and tools, providing flexible levels of challenge, providing flexible levels of support, offering a choice of rewards, and offering a choice of the context in which students learn (Rose & Meyer, 2002).

Technology and Universal Design for Learning

The principles of designing curriculum in UDL address many of the issues that CLD students face in content classrooms at the secondary school level. An important aspect of UDL is technology, especially digital text. UDL combines the flexibility of digital text with other technology tools to provide access to the curriculum while simultaneously providing the scaffolding that is often necessary for CLD students (Meyer, et al., 2005).

Technology for Literacy

Several sources tout technology as a tool for enhanced literacy opportunities (Butler-Pascoe & Wiburg, 2003; Salaberry, 1996; Valdez & Svedkaustkaite, 2002; Svedkaustkaite, Reza-Hernandez, & Clifford, 2003). The capabilities of computer software technology with the capacity to read text, echo keyboard input, or provide interactive and embedded learning strategy supports enables CLD students to continue to develop their cognitive and academic skills while concurrently developing English language competencies (Valdez & Svedkaustkaite, 2002; Svedkaustkaite et al., 2003). Lomicka (1998) concludes that multimedia annotations may contribute to increased comprehension as well as the ability to create situational models. Bransford, Brown and Cocking (1999) also state the importance of technology as a scaffolding tool to support many students' learning needs especially in the area of creating conceptual models for understanding complex concepts. The use of technology can relieve the stress of learning a new language by supporting the process of conceptualization (Garcia,1999 as referenced in Svedkaustkaite et al., 2003).

Technology can assist teachers in providing environments that support students'

learning (Bransford et al., 1999). Technology makes it easy to create opportunities for

interaction between students and teachers as well as among students as they collaborate

to solve problems, create solutions, and envision possibilities (Butler-Pascoe & Wiburg,

2003; Bransford et al., 1999). The language acquisition process, with its time period of

silence and receptivity (Krashen, 1988), can be enhanced with the use of technologies

which keep challenging students with advancing cognitive concepts and academic tasks

(Butler-Pascoe & Wiburg, 2003). Technology can assist with native language instruction

or native language support for students in a variety of languages (Hudelson et al., 2003).

The flexibility inherent in technology allows for students' exposure to content at a

language proficiency level which is comprehensible (Butler-Pascoe & Wiberg, 2003).

Incorporating technology should not be a goal of instruction in and of itself.

Technology is another tool which will benefit students as it is utilized appropriately. In

order for CLD students to benefit from appropriate inclusion of technology into their

educational experiences, two factors must be addressed; equitable access to technology

and equitable access to appropriately trained and knowledgeable teachers.

Lack of equitable access for CLD students to appropriate technology is

acknowledged in the literature (DeVillar, 2000; Butler-Pascoe & Wiburg, 2003; Warren-

Sams, 1997; Tornatzky, Macias & Jones, 2002). In schools where technology is present,

CLD students are more apt to be given activities involving drill and practice rather than

high level thinking skills involved in research and creative projects (Chisolm, 1998). It is

important for teachers to utilize technology as an appropriate tool for supporting the CLD

students' academic, cognitive, and language proficiency development and to work toward creating equity in opportunity to access technology.

Teachers of CLD students need to be trained in using technology appropriately (Warren-Sams, 1997; Echevarria et al., 2004). The appropriate integration of technology can also assist with the creation of student-centered learning environments rather than teacher-directed environments (Sandholtz, Ringstaff and Dwyer, 1992). Teachers, however, need training and ongoing support to develop confidence with the technology. In a study by Padrón and Waxman (1996), even though teachers were presented with technology and training, when it came to implementing the activities in their own classrooms many failed to choose to continue due to their own ongoing insecurities with technology. Thus teachers will need both initial training and ongoing support for technology implementation.

<div align="center">Conclusion</div>

The reality that many CLD secondary school students experience is one of low achievement, frustration, and high drop out rates. The responsibility to provide equal educational opportunity for these students is shared by all school districts in the U.S. The unique needs of CLD students combined with the challenges that confront their teachers can be addressed in a variety of ways.

This project presents the principles of UDL and the principles from the SIOP as two approaches that can be effectively utilized with secondary school CLD students. Additionally, the appropriate use of technology can be a useful tool for improving equal educational opportunity. The many literacy support software applications that exist today

can be vital and effective means of providing academically challenging as well as cognitively and developmentally appropriate content while supporting CLD students' continued acquisition of English language literacy.

CHAPTER III

RESEARCH PROCEDURE

Introduction

The Literacy Support Software Evaluation Protocol (LSSEP) created in this

project utilizes criteria from the Sheltered Instruction Observation Protocol (SIOP) and

Universal Design for Learning (UDL). The criteria selected from both the SIOP and UDL

reflect important aspects of teaching culturally and linguistically diverse (CLD) students

as established in Chapter 2.

There is overlap between the SIOP and UDL. Both emphasize the importance of

highlighting critical information and vocabulary, making explicit links to students'

background experiences and prior learning, and presenting the concepts in multiple

formats, such as pictures, audio, video, or graphic representations. Both also address the

need to provide various grouping configurations to support individual differences and to

provide ample opportunities for interaction with the teacher as well as providing ongoing

feedback.

Not all of the criteria from one, however, are represented in the other. For

example, the importance of including both content and language objectives in every

lesson is unique to the SIOP model. UDL advocates designing lessons with student

interests and choice in mind, which are issues not specifically addressed in the SIOP.

All of these criteria, both those shared between the SIOP and UDL as well as

those unique to one or the other, are represented in the LSSEP. The criteria are organized

around the three main principles of UDL: support for recognition networks, support for

strategic networks, and support for affective networks.

Universal Design for Learning

UDL is a theoretical framework for curriculum design. UDL originates from

architecture and the concept of designing buildings without barriers to access, as opposed

to modification of the building, to accommodate a wider range of access needs. UDL

emphasizes designing curriculum with the least amount of barriers to access for the

widest range of student need as opposed to modification of the curriculum for those

individuals who cannot access the content as presented. In UDL individual needs and

preferences of students must be considered before instruction so that all students can

successfully interact with the curriculum in ways best suited to the individual student

(Rose & Meyer, 2002; Meyer et al., 2005; Council for Exceptional Children, 2005;

Delaware Department of Education, 2005).

As seen in Chapter II, the three main principles of UDL center on the three main

neural networks within the brain that are used in learning: recognition, strategic and

affective networks. As a theoretical framework, the three main principles provide the

foundational guidelines for choosing curriculum which will benefit the widest range of

students and present the least amount of barriers.

Sheltered Instruction Observation Protocol

The SIOP was developed out of the best practices for sheltered instruction for

CLD students (Echevarria et al., 2004). The SIOP can be used as a tool for evaluating

instruction or as a guide for preparing effective instruction for CLD students. The SIOP

criteria are from the abbreviated version of the SIOP (Echevarria et al., 2004). In the

abbreviated version of the SIOP, the 30 criteria are numbered and ordered under the main

categories of preparation, instruction, and review/assessment. Within the instruction

category, there are six sub-divisions: building background, comprehensible input,

strategies, interaction, practice/application, and lesson delivery.

<div align="center">The Literacy Support Software Evaluation Protocol</div>

The LSSEP, which was created in Microsoft Excel, consists of 46 questions

which can be answered with either "yes" or "no." One point is given for every "yes"

response and zero is recorded for "no" responses. All of the questions operate with drop

down menus. Embedded comments attached to each question specify the criteria from the

SIOP and UDL addressed in that question. In some instances, the comments also add

further clarification to the question. Some questions can be asked in more than one area.

The question can be answered only the first time it appears. However, the questions are

repeated in later sections because the criteria are important in both categories. Including

the questions in more than one category reinforces the foundational concepts inherent in

the LSSEP design for anyone using the LSSEP to evaluate software.

A print version of the LSSEP is included in Appendix A, page 116. The

comments are also included in Appendix B on page 120. A digital version of the LSSEP

is on the CD included with this project.

Table 3.1, Table 3.2, and Table 3.3 show the relationship between the questions in

the assessment and the criteria from the SIOP and UDL. Column one contains the

assessment question. Column two states the purpose(s) the question addresses for CLD

students. Column three specifies the SIOP category which supports the question. The SIOP categories are identified by the subcategory name followed by a brief description. The main category names, preparation, instruction, or review/assessment and the specific category numbers are included parenthetically. Column four indicates the principles from UDL which are addressed by the question.

Scoring

The score for each division is calculated and reported separately. Scores are intended to indicate the potential for effective use with CLD students. The realization of effective use of the software evaluated in this project is dependent upon teacher understanding of the software and appropriate implementation of its features; any software application is just another tool in the teacher's toolbox.

Conclusion

The LSSEP created in this project, when applied to any given software application, will provide information regarding the use of the software with CLD students. The nine software applications evaluated in this project are examples of typical software designed to support language and literacy development. The specific analysis of the software is detailed in Chapter IV.

Table 3.1

Recognition Networks

Questions: Does the software.....	Purpose	SIOP Criteria	UDL Criteria
Provide the means for language and content objectives to be communicated?	To help CLD students understand the purpose of the lesson.	Clearly defined content and language objectives. (Preparation1,2).	*Question addresses issue specific to SIOP.*

Reading Scaffolds and Vocabulary Development

Include a text reader? Provide voice choice? Allow voice modifications? Highlight words as it reads? Read more than English?	To integrate reading and listening skills. To support comprehension. To integrate prior language learning (L1) with English (L2) learning.	*Comprehensible Input:* Speech; *Strategies:* Scaffolding; *Building Background:* Links between prior learning and new concepts; Integrate language skills. (Instruction 8, 10, 14; Practice/Application 22).	Use multiple representations through multiple forms of media. Use flexible means to support background knowledge. Support individual needs and preferences.
Convert files to audio files?	To integrate reading and listening skills. To support comprehension. To provide a portable alternative to reading text.	*Comprehensible Input:* Speech; *Strategies:* Scaffolding. (Instruction 10, 14).	Use multiple representations through multiple forms of media. Support individual needs and preferences.
Convert print text to digital text?	To allow students access to the wide array of print materials teachers provide.	Adaptation of Content; *Strategies:* Scaffolding. (Preparation 5; Instruction 14).	Use multiple representations through multiple forms of media. Support individual needs and preferences.

Questions: Does the software.....	Purpose	SIOP Criteria	UDL Criteria
Include a dictionary/ glossary/ thesaurus? Provide definitions in other languages? Read the definitions? Provide picture support for definitions?	To support vocabulary development. To integrate prior language learning (L1) with English (L2) learning. To support comprehension. To provide picture support for vocabulary development.	*Building Background:* Key vocabulary emphasized; Links between prior learning and new concepts; *Comprehensible Input:* Use a variety of techniques; *Practice/Application:* Clarify key concepts in L1. (Instruction 8, 9, 12, 19).	Use multiple examples. Use multiple representations through multiple forms of media. Use flexible means to support background knowledge.
Allow the inclusion of graphics, pictures, or photographs?	To support concept development and comprehension using pictures.	Use supplementary materials; *Building Background:* Links to prior experiences and learning; *Comprehensible Input:* Use a variety of techniques; *Strategies:* Scaffolding. (Preparation 4; Instruction 7,8,12,14).	Use multiple examples. Highlight critical features. Use flexible means to support background knowledge.

Multiple Means of Representation: Video

Include video playback? Allow video to be imported and embedded? Allow embedding of links to outside video sources?	To support concept development by using video as a means of demonstration.	Use supplementary materials; *Building Background:* Links to prior experiences and learning; *Comprehensible Input:* Use a variety of techniques; *Strategies:* Scaffolding. (Preparation 4; Instruction 7,8,12,14).	Use multiple examples. Use multiple representations through multiple forms of media. Use flexible means to support background knowledge. Highlight critical features. Support individual needs and preferences.

Questions: Does the software.....	Purpose	SIOP Criteria	UDL Criteria
Multiple Means of Representation: Audio			
Include audio playback? Allow audio to be imported and embedded? Allow embedding of links to outside audio sources?	To support concept development by using audio as a means of demonstration.	Use supplementary materials; *Building Background:* Links to prior experiences and learning; *Comprehensible Input:* Use a variety of techniques; *Strategies:* Scaffolding. (Preparation 4; Instruction 7,8,12,14).	Use multiple examples. Use multiple forms of media. Use flexible means to support background knowledge. Highlight critical features. Support individual needs and preferences.
Multiple Means of Representation: Animation			
Include and play animation?	To support concept development by using animation as a means of demonstration.	Use supplementary materials; *Building Background:* Links to prior experiences and learning; *Comprehensible Input:* Use a variety of techniques; *Strategies:* Scaffolding. (Preparation 4; Instruction 7,8,12,14).	Use multiple examples. Use multiple forms of media. Use flexible means to support background knowledge. Highlight critical features. Support individual needs and preferences.
Multiple Means of Representation: Graphics, Pictures, or Photographs			
This category has already been addressed under reading scaffolds and vocabulary development			
Highlighting Critical Features			
Permit highlighting of critical features or vocabulary? Permit highlighting and automatic extraction to another page or document? Permit marking of specific location in text?	To support concept development and comprehension.	*Building Background:* key vocabulary emphasized; *Comprehensible Input:* Use a variety of techniques; *Strategies:* Scaffolding. (Instruction 9, 12, 14).	Highlight critical features. Support individual needs and preferences.

Table 3.2

Strategic Networks

Questions: Does the software.....	Purpose	SIOP Criteria	UDL Criteria

Process and Learning Strategies

Support or provide graphic organizers?	To support vocabulary and concept development, planning, brain storming, and presentations with graphic representations.	Supplementary materials; Adaptation of content; *Building Background*: Links to prior experiences and learning; Key vocabulary emphasized; *Comprehensible input*: Use a variety of techniques; *Strategies*: Strategies & Scaffolding. (Preparation 4, 5; Instruction 7, 8, 9,12, 13, 14)	Provide flexible models of the concepts. Highlight critical features. Support individual needs and preferences.
Allow or support embedded process supports? Allow teacher to voice record embedded prompts?	To support process learning. To scaffold processes. To support comprehension of academic tasks. To integrate reading and listening skills. To connect to students' prior knowledge and experiences.	*Comprehensible Input*: Clear explanation of academic tasks; Use a variety of techniques; *Strategies*: Strategies & Scaffolding; *Practice/Application*: Integrate language skills; Apply language and content knowledge to activities (Instruction 11, 12, 13, 14, 21, 22).	Provide flexible models of the concepts. Provide opportunities to practice with scaffolds. Support individual needs and preferences. Provide choice of strategies to employ.
Include or allow embedded learning strategies?	To support strategy learning. To scaffold concept and vocabulary development with learning strategies.	*Comprehensible Input*: Use a variety of techniques; *Strategies*: Strategies and Scaffolding; *Practice/Application*; Apply language and content knowledge to activities (Instruction 12, 13, 14, 21).	Provide flexible models of the concepts. Provide opportunities to practice with scaffolds. Support individual needs and preferences. Provide choice of strategies to employ.

Questions: Does the software.....	*Purpose*	*SIOP Criteria*	*UDL Criteria*
Include or allow embedded self-monitoring strategies?	To encourage student control of learning. To enhance motivation and engagement.	Regularly provide feedback (Review/Assessment 29).	Provide ongoing feedback. Teach self-monitoring strategies. Provide choice of strategies to employ. Support individual needs and preferences.
Include or allow embedded feedback?	To encourage student control of learning. To enhance motivation and engagement.	Regularly provide feedback (Review/Assessment 29).	Provide ongoing feedback. Teach self-monitoring strategies. Provide choice of strategies to employ. Support individual needs and preferences.

Grouping

Allow students to work together in supportive environment?	To support students working together. To support CLD students interactions with native English-speaking peers.	*Interaction*: Opportunities for interaction encourages elaborated responses; Grouping configurations support objectives. (Interaction 16, 17).	Support individual needs and preferences.
Support student-teacher interactions?	To provide teachers and students opportunity to interact. To provide teachers ability to tailor activities to individual student's needs.	*Interaction*: Opportunities for interaction encourages elaborated responses; Grouping configurations support objectives.(Interaction 16, 17).	Support individual needs and preferences.
Include features which allow teachers to track student progress?	To support creation of individual student accounts. To provide teachers ability to tailor activities to individual student's needs. To support teachers' monitoring of student progress/ responses.	Adaptation of content; *Strategies*: Scaffolding; Conduct assessment throughout lesson. (Preparation 5; Review/Assessment 30).	Provide choice of demonstration of learning. Support individual needs and preferences.

Questions: Does the software…..	Purpose	SIOP Criteria	UDL Criteria
Permit embedding of links to additional supports?	To scaffold processes. To provide teachers ability to tailor activities to individual student's needs. To provide students means to obtain additional support as needed.	Supplementary materials; Adaptation of content; *Building Background*: Links to prior experiences and learning; *Comprehensible input*: Use a variety of techniques; *Strategies:* Strategies & Scaffolding. (Preparation 4,5; Instruction 7, 8, 12, 13, 14).	Provide opportunities to practice with support. Provide choice of strategies to employ. Support individual needs and preferences.

Reading Scaffolds

Questions already addressed under Recognition Networks: Reading Scaffolds and Vocabulary Development.

Writing Scaffolds

Provide word prediction?	To support students vocabulary development. To support student word choice and word recall. To support students' writing development.	*Strategies*: Strategies and Scaffolding; *Practice/Application*: Integrate language skills; Apply language and content knowledge to activities. (Instruction 13, 14, 21, 22).	Provide opportunities to practice with scaffolds. Provide choice of strategies to employ. Support individual needs and preferences.
Include speech recognition?	To provide an alternative means to accomplish written communication for students with stronger oral than writing skills.	*Strategies*: Strategies and Scaffolding; *Practice/Application*: Integrate language skills; Apply language and content knowledge to activities. (Instruction 13, 14, 21, 22).	Provide opportunities to practice with scaffolds. Provide choice of strategies to employ. Support individual needs and preferences. Provide choice for demonstration of learning.

Questions: Does the software.....	Purpose	SIOP Criteria	UDL Criteria
Drawing Scaffolds			
Provide drawing or graphics tools?	To provide an alternative choice for demonstration of learning. To provide an alternative means to drawing for students with stronger technology than drawing skills.	*Strategies*: Strategies and Scaffolding; *Practice/Application*: Provide hands-on materials for; Apply language and content knowledge to activities. (Instruction 13, 14, 20, 21).	Provide opportunities to practice with scaffolds. Provide choice of strategies to employ. Support individual needs and preferences. Provide choice for demonstration of learning.

Speech Scaffolds

Include a text reader?
This question is addressed under Recognition Networks: Reading Scaffolds and Vocabulary Development.

Allow voice recording?	To provide an alternative means to communicate ideas.	*Strategies*: Strategies and Scaffolding; *Practice/Application*: Integrate language skills; Apply language and content knowledge to activities. (Instruction 13, 14, 21, 22).	Provide opportunities to practice with scaffolds. Provide choice of strategies to employ. Support individual needs and preferences. Provide choice for demonstration of learning.

Integration of Four Communication Skills: Reading, Writing, Speaking, Listening

Support or provide activities which integrate communication skills?
   Support integration of 3 skills?
   Support integration of 4 skills?
	To support language learning and concept development. To integrate communication skills in the activities or academic tasks.	*Practice/Application*: Integrate language skills (Instruction: 22).	*Question addresses issues specific to L2 acquisition and SIOP.*

Expression/Presentation of Learning

Questions addressed under Reading, writing, Drawing, and Speech Scaffolds above.

Table 3.3

Affective Networks

Questions: Does the software.....	*Purpose*	*SIOP Criteria*	*UDL Criteria*
Provide or support adjustable levels of challenge?	To target individual student's ZPD. To enhance motivation and engagement.	*Question addresses issues specific to UDL.*	Provide flexible levels of challenge. Support individual student need and preferences.
Provide or support adjustable levels of support?	To target individual student's ZPD. To enhance motivation and engagement.	*Question addresses issues specific to UDL.*	Provide flexible levels of challenge. Support individual student need and preferences.
Support student choice? Provide or support choice of content? Provide or support choice of features or tools? Provide or support choice of learning context?	To target individual student's ZPD. To enhance motivation and engagement. To address individual differences in interests, background knowledge, motivation, and engagement.	*Question addresses issues specific to UDL.*	Provide flexible levels of challenge. Support individual student need and preferences. Provide choice of content, learning context, and tools.

Provide ongoing, relevant feedback?

Question already addressed under Strategic Networks: Process and Learning Strategies

CHAPTER IV

FINDINGS

Introduction

The researcher-created assessment tool for this project, the Literacy Support Software Evaluation Protocol (LSSEP), is based upon criteria for effective lesson design and delivery from the Sheltered Instruction Observation Protocol (SIOP) and the theoretical principles of Universal Design for Learning (UDL) for designing curriculum with minimal barriers to access and learning for all students. The LSSEP, which was created in Microsoft Excel, is based upon answering a series of questions with either "yes" or "no." Embedded comments for each question provide the theoretical basis for the question and, in some instances, add further clarification to the question. Scoring is automatically computed and shows up as percentages.

The LSSEP is organized into three divisions around the main principles from UDL: support students' recognition networks with flexible modes of presentation, support students' strategic networks with flexible modes for expression of learning, and support students' affective networks with flexible modes of support and challenge, as well as by providing for student choice and preferences (Council for Exceptional Children, 2005; Meyer et al., 2005; Rose & Meyer, 2002). As all students are individuals with differing strengths, interests, and needs for challenge and support, creating curriculum with built-in flexibility allows access to the curriculum and access to learning for the greatest number of students.

48

The assessment of a given piece of software generates one score for each division. The scores are not combined into one overall score. Each software application has its own focus and intent and, therefore, no one application will match all the criteria in the entire assessment. The evaluation results provide a means of measuring the potential effectiveness of the software for use with CLD students. The discussion of the results focuses on the relative strengths of the software in each division as viewed from the research question: Can literacy support software facilitate CLD students' literacy development in secondary, content area classrooms?

Software

The software applications evaluated in this project are typically classified as assistive technology. Each program is unique and does not address the exact same issues and skills as the others. Some of the software is created for specific types of tasks and others address a more broad range of skills and uses. As a result, no one application will completely meet all the criteria in the assessment. Table 4.1 is a summary of the software evaluated and their typical or intended usage.

The software applications are considered in alphabetical order. At the conclusion of this chapter, on page 104, Table 4.29 shows a summary of the criteria and which software applications meet the criteria. Contact information for each software publisher is found in Appendix C on page 131. A graph showing the nine software applications and their scores for each of the three divisions is found in Appendix D on page 134.

Table 4.1

Software Titles and Uses

Software Title	Manufacturer	Usage
Classroom Suite	Intellitools Inc.	Multi-media authoring and activity-based learning.
Clicker 5	Crick Software	Mutli-media authoring and activity-based learning.
Inspiration 8	Inspiration Software	Planning, thinking, visualizing and organizing.
Kurzweil 3000	Kurzweil Learning Systems	Comprehensive reading, writing and learning.
Microsoft Word	Microsoft, Inc.	Word processing for business applications.
Solo	Don Johnston Company	Research to writing process support.
Read and Write Gold 8	Text Help Systems	Comprehensive reading, writing, and learning.
Thinking Reader	Tom Snyder Productions	Reading strategy and reading comprehension.
WYNN 5.0	Freedom Scientific	Comprehensive reading, writing, and learning.

Classroom Suite

Classroom Suite is created by Intellitools, a Cambium Learning Technologies

Company. Classroom Suite is a high powered, comprehensive, multimedia authoring tool

for creating activities to scaffold learning, develop and practice skills, enhance concept

development, and even take tests. The activities incorporate animation, video, audio, pictures, and text.

The activities created in Classroom Suite support learning across all content areas. Classroom Suite comes with a large number of ready made activities and templates which are customizable to meet individual student's needs and preferences.

Classroom Suite is unique among the software evaluated in this project. In the hands of a teacher, it is a tool for creating activities. In the hands of a student, it is a tool for activity based learning on any topic throughout the content areas. Reading, writing, and research skills are integrated into the activities. Many of the ready made activities in Classroom Suite are targeted at the elementary level. However, the capabilities of the program make it suitable for use with early secondary students as well.

With Classroom Suite, teachers and students can develop multimedia presentations on any topic, create talking and animated books, or animate concepts from math, science, or social studies to enhance understanding. These are only a few of the types of activities that Classroom Suite supports. The possibilities extend to most any concept or topic a student may encounter.

Classroom Suite: Discussion of Findings

Classroom Suite meets the criteria for software use in supporting CLD students' literacy development in several areas. Classroom Suite is designed for activity based learning rather than just for literacy support and, therefore, some of the criteria in this evaluation are not supported in Classroom Suite. On the other hand, some of Classroom Suite's unique capabilities extend beyond the content of this assessment. Classroom Suite

scores 73.9% for recognition networks, 75.9% for strategic networks, and 100% for affective networks.

Classroom Suite: Support for Recognition Networks

Teachers will find the extensive features of Classroom Suite well suited to providing multiple means of presenting content. Classroom Suite's strength is the wide range of flexible options that exist. For example, video, audio, and animation tools enable teachers to provide multimedia activities to support understanding. Classroom Suite includes a text reader with all the options for modification of the voice to enhance comprehension. It also reads Spanish text and includes choices of Spanish speaking voices.

The few areas under recognition networks not supported in Classroom Suite include dictionary and thesaurus, converting printed text to digital text, and conversion of files to MP3 format. The absence of these features is due to the activity based learning concept behind the design of Classroom Suite; these features are not directly included because Classroom Suite is an authoring tool as opposed to a reading and writing support tool. It should be noted, however, that teachers can create a wide range of activities with Classroom Suite including a thesaurus or specialized dictionary activity for a specific topic.

Table 4.2 shows the criteria for recognition networks and indicates which criteria are supported by the features in Classroom Suite.

Table 4.2

Classroom Suite Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	●
TR: Voice choice	●	Video: Import and embed	●
TR: Voice modification	●	Video: Embed links	●
Highlights as reads	●	Audio: Playback	●
Multiple languages	●	Audio: Import and embed	●
Convert files to MP3		Audio: Embed links	●
Convert print to digital format		Animation	●
Glossary/Dictionary/Thesaurus		Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	●
Gloss/Dict/Thes: Read Defin.		Highlight to mark location	●
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 73.9%

Classroom Suite: Support for Strategic Networks

Process and learning strategy supports are key concepts in both UDL and the

SIOP. The ability to embed process supports and learning strategies taps into some of

Classroom Suite's strongest features. Teachers can voice record any messages or

supports. Bilingual teachers will find the choice to record in English or another language very helpful for scaffolding instructions and activities for CLD students. Students also can voice record in English or their first language.

The graphic tools in Classroom Suite allow students to use objects to present concepts. These objects can be animated and sound or video files connected to them. Classroom Suite supports the integration of all four communication skills into any activity.

Table 4.3 shows the criteria for strategic networks and indicates which criteria are supported by the features in Classroom Suite.

Classroom Suite: Support for Affective Networks

Classroom Suite can be used to create activities across all content areas and tailored to any individual student's needs. The extensive flexibility built into Classroom Suite creates many avenues for supporting student motivation and engagement. Teachers, especially those working with CLD students in early secondary classrooms, will find Classroom suite an appealing technology tool. The web site for Intellitools contains many ready made activities which can be modified as needed to support an individual student's needs or preferences. Classroom Suite meets 100% of the criteria for affective networks.

Table 4.4 shows the criteria for affective networks and indicates which criteria are supported by the features in Classroom Suite.

Classroom Suite: Conclusion

Classroom Suite's flexibility and extensive multimedia authoring tools provide many creative avenues for teachers to present content to CLD students and for CLD

Table 4.3

Classroom Suite Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers	●	Embed links to supports	●
Embed process support	●	Word prediction	●
Voice record process supports	●	Speech recognition	
Embed learning strategies	●	Drawing/graphic tools	●
Embed self-monitoring	●	Voice recording	●
Embed feedback	●	Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	●
Tracking of student progress	●		

Total Strategic Networks: 75.9% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

students to interact with content and demonstrate learning. Through the use of the activities already created for Classroom Suite, either those which come with the software or those that can be accessed for free from the Intellitools web site, teachers can begin to use Classroom Suite rather easily. Though learning to create activities in Classroom Suite requires professional development time, Classroom Suite is nonetheless a strong match for the criteria for effective software use to support CLD students' literacy development.

Table 4.4

Classroom Suite Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		
		Total Affective Networks: 100%	

Clicker 5

Clicker 5 is created by Crick Software. Clicker 5 is a high powered, multimedia

writing support tool for creating activities across the content areas. Clicker 5 has a unique

design among the software included in this project. In Clicker 5 the screen can be divided

horizontally into two sections. The top section works as a standard word processor. The

bottom section consists of a number of cells which can contain words, phrases, pictures

or complete sentences. Students can hear the words from the bottom grid by passing the

mouse over the word. If they choose to include the word, they click on it and it is inserted

into their writing at the top.

Teachers can use Clicker 5 activities to support vocabulary and concept

development as well as to create presentations and talking, animated books. Clicker 5 can

incorporate audio, video, and animation into its activities. The accompanying web site for

Clicker 5, www.learninggrids.com, contains many ready made activities across the content areas available for teachers to use for free. Though many of the existing activities are geared toward younger students, teachers can easily create activities for any age group.

Clicker 5: Discussion of Findings

Clicker 5 has many unique features which meet the criteria for effective use of software to support CLD students' literacy development. Clicker 5 provides teachers with a high powered, creative authoring tool with which they can create activities across the content areas. CLD students can also use Clicker 5 to create projects, such as talking books, presentations, and word banks, to name a few. Clicker 5 scores 65.2% for recognition networks support, 65.5% for strategic networks support, and 100% for affective networks support.

Clicker 5: Support for Recognition Networks

Teachers can use Clicker 5 multimedia tools to present concepts, especially content specific academic language. The text reader in Clicker 5 supports multiple languages. Teachers can create activities which include students' first language support for English vocabulary. Because Clicker 5 is designed for activity based learning and multimedia authoring and not just for literacy support, it does not include converting from text to audio files or from print to digital files. It also does not include a dictionary or thesaurus. However, teachers can readily create such tools using the multimedia capabilities and tailor the vocabulary to the student's specific needs.

Clicker 5 activities can support English as well as other languages, include voice
recorded or other audio files, pictures, animation, or video. Clicker 5 is an effective and
high powered tool to support recognition networks.

Table 4.5 shows the criteria for recognition networks and indicates which criteria
are supported by the features in Clicker 5.

Table 4.5

Clicker 5 Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	●
TR: Voice choice	●	Video: Import and embed	●
TR: Voice modification	●	Video: Embed links	●
Highlights as reads	●	Audio: Playback	●
Multiple languages	●	Audio: Import and embed	●
Convert files to MP3		Audio: Embed links	●
Convert print to digital format		Animation	●
Glossary/Dictionary/Thesaurus		Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	
Gloss/Dict/Thes: Read Defin.		Highlight to mark location	
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 65.2%

Clicker 5: Support for Strategic Networks

The design of Clicker 5 makes it an effective scaffolding tool and its strengths are in its abilities to enhance nearly any concept or activity CLD students may encounter. Clicker 5's design utilizing cells results in a unique manner in which the process and learning strategy supports are embedded. Teachers can use Clicker 5 to create vocabulary exercises or to create specific vocabulary supported writing activities. CLD students can use Clicker 5 to create projects, books, animated concepts, and any other number of activities.

The multi-language supports in Clicker 5 will support student interactions if CLD students are paired with students whose first language differs from their own. The ability to embed sound and video files expands the possibilities for creating authentic and meaningful activities to support CLD students' literacy development.

Table 4.6 shows the criteria for strategic networks and indicates which criteria are supported by the features in Clicker 5.

Clicker 5: Support for Affective Networks

Clicker 5 can be used to create activities across all content areas tailored to any individual student's needs. This supports the criteria for flexible levels of challenge and support as well as the criteria for student choice. Clicker 5 meets 100% of the criteria for affective networks.

Table 4.7 shows the criteria for affective networks and indicates which criteria are supported by the features in Clicker 5.

Table 4.6

Clicker 5 Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers	●	Embed links to supports	●
Embed process support	●	Word prediction	
Voice record process supports	●	Speech recognition	
Embed learning strategies	●	Drawing/graphic tools	
Embed self-monitoring	●	Voice recording	●
Embed feedback	●	Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	●
Tracking of student progress			

Total Strategic Networks: 65.5% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

Clicker 5: Conclusion

Clicker 5's extensive features for authoring multimedia activities allow for

flexible presentation of content as well as creative and flexible modes for CLD students

to demonstrate learning. Clicker 5 is a strong match to the criteria for effective use of

software to support CLD students' literacy development.

Table 4.7

Clicker 5 Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		

Total Affective Networks: 100%

Inspiration 8

Inspiration 8 is created by Inspiration Software, Inc. Inspiration 8 supports

students as they plan, research, and complete any type of project; written paper, oral

presentation, or group activity. It permits students to embed audio and video files, MP3

files, pictures, graphics, and links to other documents, files or web sites. Students can

brainstorm and organize their thoughts graphically and add pictures, symbols, sounds, or

links to further support their thinking. Inspiration 8 includes multiple templates and

examples of graphic organizers for teachers and students to use and individualize to any

desired extent.

Inspiration 8 also switches between diagram and outline view. Students can

expand on their initial ideas graphically represented in the diagram view by switching

into outline view, exporting to any preferred word processing tool, and writing from the outline.

Teachers can use Inspiration 8 to create supported scaffolds for any process learning. It allows teachers to embed notes, written or voice recorded, and is easily tailored to support individual student's needs and preferences. Teachers and students can use Inspiration 8 for presentations. It has text reader capabilities and reads multiple languages.

Inspiration 8: Discussion of Findings

The results of this evaluation indicate that Inspiration 8 meets many of the criteria for software use in supporting CLD students' literacy development. Inspiration 8 scores 65.2% for recognition networks support, 69% for strategic networks support, and 100% for affective networks support.

Inspiration 8: Support for Recognition Networks

Both teachers and CLD students will benefit from using Inspiration 8 to support presentation and acquisition of content in secondary content classrooms. Inspiration works well as a presentation tool and readily supports links to documents, sound or video files, and web pages. The text reader supports multiple languages and reads the included dictionary definitions in English.

Inspiration 8 is a powerful tool for presenting content, especially in highlighting important or distinguishing features of the content. Inspiration 8's strength is in its ability to create graphic representations of any concept. Both the SIOP and UDL indicate that graphic organizers are highly effective in supporting concept and literacy development

for CLD students. Graphic organizers created in Inspiration 8 can be enhanced with audio files, or graphics, as well as links to other files, documents, or Internet sites. This ability to support literacy with graphic representations of vocabulary and concepts is an important part of scaffolding instruction as advocated by both UDL and the SIOP. Inspiration includes many templates across the content areas which are easily adaptable and rich with ideas to use as starting points to present most any content CLD students will encounter in secondary content classrooms.

Table 4.8 shows the criteria for recognition networks and indicates which criteria are supported by the features in Inspiration 8.

Inspiration 8: Support for Strategic Networks

Teachers will find Inspiration 8 very helpful in supporting CLD students as they research, plan and organize any type of assignment. Teachers can embed process supports through the use of notes, both voice recorded and written. Students can use Inspiration 8 to brainstorm and organize their projects, assignments, or reports either as individuals or in partners or groups. CLD students who are paired with native English-speaking peers can use the text reader and dictionary tools to support communication and comprehension.

Students can use Inspiration 8 for presenting final projects. Enhancing presentations with the audio, video, and included animation features of the Inspiration 8 graphics library supports students' demonstration of learning while reinforcing concepts through the use of multimedia. Links are easily established between the Inspiration 8 document and other files or web pages.

Table 4.8

Inspiration 8 Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	●
TR: Voice choice	●	Video: Import and embed	●
TR: Voice modification		Video: Embed links	●
Highlights as reads		Audio: Playback	●
Multiple languages	●	Audio: Import and embed	●
Convert files to MP3		Audio: Embed links	●
Convert print to digital format		Animation	●
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 65.2%

Inspiration 8 includes an extensive symbols library which can be searched for particular pictures. It is organized according to content areas and common themes, such as every day life, people, transportation, etc.

The arrangement of the graphic organizer is easily changed and customized to the students' preferences. The word guide allows CLD students to look up particular words, read or listen to the definition, and click to include the word or a synonym which is displayed, thus supporting vocabulary development. Students can switch from the design view to outline view and rearrange the levels of the outline or include more supporting details.

Table 4.9 shows the criteria for strategic networks and indicates which criteria are supported by the features in Inspiration 8.

Inspiration 8: Support for Affective Networks

This evaluation indicates that Inspiration 8 meets 100% of the criteria for supporting affective networks. Due to the extensive graphics library and the inclusion of project templates across the content areas, Inspiration 8 is well suited to support student choice. Teachers can readily adjust the level of support or challenge in Inspiration 8 documents to match the needs of an individual CLD student. Table 4.10 shows the criteria for affective networks and indicates which criteria are supported by the features in Inspiration 8.

Inspiration 8: Conclusion

Inspiration 8 is well designed to support CLD students with planning, research, and organization. Many students as well as teachers will discover that the ability to quickly brainstorm and generate visual representations of their ideas and plans makes Inspiration 8 an attractive tool. Because Inspiration 8 can readily export to a word processor, using Inspiration 8 in conjunction with another application provides CLD

Table 4.9

Inspiration 8 Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers	●	Embed links to supports	●
Embed process support	●	Word prediction	
Voice record process supports	●	Speech recognition	
Embed learning strategies	●	Drawing/graphic tools	●
Embed self-monitoring	●	Voice recording	●
Embed feedback	●	Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	●
Tracking of student progress			

Total Strategic Networks: 69% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

students a powerful scaffolding tool for the writing and project requirements for any secondary content classroom. The graphics library and the activity templates which come with Inspiration 8 make it easy for both teachers and students to quickly begin using and customizing Inspiration 8.

Table 4.10

Inspiration 8 Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		

Total Affective Networks: 100%

Kurzweil 3000

Kurzweil 3000 is created by the Kurzweil Educational Systems, a Cambium

Learning Technologies Company. Kurzweil 3000 offers a comprehensive set of literacy

support tools for reading, writing, and research. Kurzweil 3000's features support

students who benefit from reading, writing process, studying, and test taking scaffolds.

Kurzweil 3000 reads text and portable document file (PDF) documents and converts print

into digital text. Kurzweil can search for and download web based materials which can be

read and manipulated in the same manner as all other digital text.

The text reader supports a number of languages. The dictionaries are bilingual as

well as recursive, which means that all words within the definition are also defined and

can be accessed by clicking on the word. The study skills tools permit highlighting

concepts in different colors, thus supporting outlining and identification of main ideas

and supporting details. Kurzweil 3000 also permits embedding notes and bookmarks into digital text. These can be added by the teacher to provide scaffolds for procedural or learning strategies or by the student to aid in note taking and analysis of text.

Kurzweil 3000 has word processor capabilities which include a text reader and word prediction in addition to the usual palette of text editing tools found on most word processors. Kurzweil 3000 is unique among the software analyzed for this project in that it allows teacher-made and standardized tests to be scanned into the software. The tests can be read aloud and answers can be recorded electronically, supporting both selected-response tests and constructed-response tests. Students can voice record answers, type and edit answers, or drag and drop text into spaces provided for answers. The most recent version of Kurzweil 3000 allows students to circle answers as well.

Kurzweil 3000: Discussion of Findings

Kurzweil 3000 meets the criteria for software use in supporting CLD students' literacy development in a number of areas. Kurzweil 3000 scores 79.3% for recognition networks support, 89.7% for strategic networks support, and 100% for affective networks support.

Kurzweil 3000: Support for Recognition Networks

Both teachers and students will benefit from using Kurzweil to support the presentation and acquisition of content. Any print material that teachers want to present to students can be transferred into digital format so that students can access the language support they need if the printed text exceeds their academic language level. This includes textbooks as well as articles, handouts, and other supplementary print materials common

to secondary content classrooms. Kurzweil supports the transfer of the digital text into an audio format that permits students to listen to the material using a portable MP3 player. Students can listen to the text being read while following along with the print version. This can be very helpful for supporting students when they do not have access to a computer.

The only criteria under recognition networks not supported in Kurzweil are video and animation. Audio files can be played though links cannot be made from Kurzweil to outside audio files. Table 4.11 shows the criteria for recognition networks and indicates which criteria are supported by the features in Kurzweil 3000.

Kurzweil 3000: Support for Strategic Networks

Kurzweil 3000 enables teachers to create process or learning strategy supports for CLD students. Teachers can embed notes, either written or voice recorded, which students can access as needed to support their understanding of the text or assignment. Teachers can also embed bubble notes which automatically pop up when the student reaches the part of the text where the bubble note is embedded. The ability to embed supports into the text itself allows for the individualization of curriculum as advocated by UDL. Scaffolding learning is also advocated by the SIOP.

Teachers can track student progress using the student usage logs. Based upon the data collected for each student, teachers can adapt the curriculum and the scaffolds as needed for each student user account created within Kurzweil 3000.

In addition to the standard word processing tools, Kurzweil includes dictionary support for which ever language the student is using. The toolbars for Kurzweil are easy

Table 4.11

Kurzweil 3000 Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	
TR: Voice choice	●	Video: Import and embed	
TR: Voice modification	●	Video: Embed links	
Highlights as reads	●	Audio: Playback	●
Multiple languages	●	Audio: Import and embed	
Convert files to MP3	●	Audio: Embed links	
Convert print to digital format	●	Animation	
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.	●	Highlight and extract	●
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	●
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 73.9%

to show or hide and allow easy modification of rate of speech or language choice. CLD

students can complete research and read the material in a supportive environment.

Kurzweil permits the creation of specialized glossaries, and the text reader will read the

definitions. Kurzweil's highlighting tools enable students to mark key passages and then

extract those passages to a new document as notes.

Table 4.12 shows the criteria for strategic networks and indicates which criteria

are supported by the features in Kurzweil 3000.

Table 4.12

Kurzweil 3000 Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers		Embed links to supports	●
Embed process support	●	Word prediction	●
Voice record process supports	●	Speech recognition	
Embed learning strategies	●	Drawing/graphic tools	
Embed self-monitoring	●	Voice recording	●
Embed feedback	●	Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	●
Tracking of student progress	●		

Total Strategic Networks: 89.7% [a]

[a] Score for strategic networks includes score for reading scaffold questions from
recognition networks. See assessment example in Appendix A, page 116.

Kurzweil 3000: Support for Affective Networks

This evaluation indicates Kurzweil meets 100% of the criteria for supporting affective networks. Individualizing the levels of support and challenge is important for CLD students as advocated by UDL and the SIOP. Kurzweil supports student choice of content and learning context. Kurzweil supports students working together or individually. CLD students can be paired with native English-speaking peers and Kurzweil 3000 provides the tools they need to support communication.

Table 4.13 shows the criteria for affective networks and indicates which criteria are supported by the features in Kurzweil 3000.

Table 4.13

Kurzweil 3000: Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		

Total Affective Networks: 100%

Kurzweil 3000: Conclusion

Kurzweil is well designed to support flexibility in presenting information to students and supporting students as they interact with the concepts and demonstrate

learning. The strong connection between Kurzweil's features and the criteria for supporting CLD students' literacy development make Kurzweil an attractive tool for use with CLD students.

Microsoft Word

Microsoft (MS) Word is a complex, high powered word processing tool and part of the Microsoft Office Suite. Since it is designed for business applications, many of its features do not meet the criteria for this assessment but others can be used to support CLD students. MS Word is included in this assessment because it is readily available to teachers and students as a common load on most desk top computers, both in schools and homes.

MS Word: Discussion of Findings

MS Word is used by many students to generate written documents for school projects and assignments. The criteria in this assessment address the specific needs of CLD students as outlined in the SIOP and the criteria for flexible curriculum as outlined in UDL. The results of this evaluation indicate that MS Word meets some of the criteria for software use in supporting CLD students' literacy development. Because MSWord is not designed for educational settings, the tools to support CLD students do not readily exist in MS Word or may exist but are more difficult to utilize in support of CLD students. Teachers may find the work involved in trying to provide flexible support for their CLD students rather difficult and time intensive to be realistic or effective. MS Word scores 34.8% for recognition networks support, 48.3% for strategic networks support, and 57.1% for affective networks support.

MS Word: Support for Recognition Networks

MS Word supports standard word processing features. Speech recognition and a text reader are supported through the Windows operating system software. They can be turned on from within MS Word but voice modifications cannot be made from within MS Word. MS Word supports graphics and links to video and audio files. Highlighting can be done by selecting text and then changing features, such as font color or size, but MS Word does not support automatic extraction of the highlighted text to another file.

Teachers can use MS Word to present content. MS Word meets approximately one third of the criteria for effective use with CLD students; it is less attractive a tool than some other applications.

Table 4.14 shows the criteria for recognition networks and indicates which criteria are supported by the features in MS Word.

MS Word: Support for Strategic Networks

A major feature which MS Word accesses through the Windows operating system software is speech-to-text or speech recognition. Students can train a voice file by speaking into a microphone, thus enabling the software to recognize their individual speech patterns. The student can then dictate to the computer and the text appears as if the student has typed.

MS Word has graphics tools which support students in representing their ideas through drawing. MS Word can integrate speaking, listening, reading, and writing which supports CLD students' comprehension. Table 4.15 shows the criteria for strategic networks and indicates which criteria are supported by the features in MS Word.

Table 4.14

MS Word Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	
TR: Voice choice		Video: Import and embed	
TR: Voice modification		Video: Embed links	●
Highlights as reads		Audio: Playback	
Multiple languages		Audio: Import and embed	
Convert files to MP3		Audio: Embed links	●
Convert print to digital format		Animation	
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 34.8%

MS Word: Support for Affective Networks

It is important for teachers to be able to customize applications and individualize assignments in order to support individual CLD students' needs and literacy levels. This ability to provide individual levels of support or challenge is a criterion which affects

Table 4.15

MS Word Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers		Embed links to supports	●
Embed process support	●	Word prediction	
Voice record process supports		Speech recognition	●
Embed learning strategies	●	Drawing/graphic tools	●
Embed self-monitoring		Voice recording	●
Embed feedback		Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	●
Tracking of student progress			

Total Strategic Networks: 48.3% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

students' motivation and engagement as outlined in UDL. MS Word, though a powerful word processing tool designed for business applications, shows little among its array of features that would enable teachers to readily or easily accommodate student differences. For this evaluation, MS Word meets the criteria for supporting student choice but does not meet the criteria for individualizing levels of support or challenge. Table 4.16 shows

the criteria for affective networks and indicates which criteria are supported by the

features in MS Word.

Table 4.16

MS Word Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge		Choice of learning context	●
Adjustable levels of support		Choice of features/tools	●
Student choice	●	Embed feedback	
Student choice of content	●		
		Total Affective Networks: 57.1%	

MS Word: Conclusion

Because MS Word is a common application available to students on most school

and home computers, it is important to recognize that students do use MS Word at the

secondary level for school projects or assignments. It may be tempting to think that

having such a powerful word processing tool is meeting the needs of CLD students.

However, as this evaluation indicates, MS Word does not meet enough of the criteria for

effective use in supporting CLD students' literacy development to be considered an

effective tool. The next software evaluated is an application used in conjunction with MS

Word. Combing MS Word with Read and Write Gold 8 produces a greater match to the criteria in this evaluation than did MS Word alone.

Read and Write Gold 8 with MS Word

Read and Write Gold 8 is created by Text Help Systems. Read and Write Gold 8 is a literacy support application for reading, writing, and research. It is designed as an overlay program that can interact with other applications or web sites. It is fully compatible with the Microsoft Office Suite as well as other word processing and web browser software. For this project, Read and Write Gold 8 is evaluated while being used in conjunction with MS Word precisely because it is not designed to be used as a stand-alone application.

Read and Write Gold 8 launches as a tool bar which can be docked to either side or at the top of the computer screen. All of its features are then available for use with another application, such as MS Word. Read and Write Gold 8 provides a full range of features to support reading and writing, such as a dictionary, speech recognition, and word prediction in addition to the usual palette of word processing tools. Read and Write Gold 8 inserts an extra tool bar into MS Word which includes highlighting pens and the ability to automatically collect the highlighted information into another document.

Read and Write Gold 8 includes some non-standard features which are helpful for CLD students. The translator tool allows students to click on any word and see it translated into Spanish. The Fact Finder tool is another unique feature which allows information and pictures to be easily captured from web sources and stored and

categorized with titles and descriptions. These facts can be saved in a variety of formats for students to implement into their projects as needed.

<p style="text-align:center;">*Read and Write Gold 8: Discussion of Findings*</p>

The results of this evaluation indicate that Read and Write Gold 8 meets many of the criteria for software use in supporting CLD students' literacy development. Read and Write Gold 8 scores 69.6% for recognition networks support, 69% for strategic networks support, and 85.7% for affective networks support.

Read and Write Gold 8: Support for Recognition Networks

Teachers can use the features in Read and Write Gold 8 to aid in presenting content in multiple ways. Video and audio can be accessed via links allowing teachers to include video and audio as aids in presenting content. It is very useful as a text reader. Teachers can present information by scanning text into Read and Write Gold 8. Teachers can use Read and Write Gold 8 to browse the web. Read and Write Gold 8 can read digital text, such as talking books or digital textbooks, and the files can be saved in a format which allows students to listen to the text using portable MP3 players. This allows CLD students to listen to the text while reading along with the print copy when they don't have access to a computer. Read and Write Gold 8 includes an English dictionary. Teachers can utilize the highlighting features to emphasize the critical features of the concept they are teaching.

Table 4.17 shows the criteria for recognition networks and indicates which criteria are supported by the features in Read and Write Gold 8.

Table 4.17

Read and Write Gold 8 Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	
TR: Voice choice	●	Video: Import and embed	
TR: Voice modification	●	Video: Embed links	●
Highlights as reads	●	Audio: Playback	
Multiple languages	●	Audio: Import and embed	
Convert files to MP3	●	Audio: Embed links	●
Convert print to digital format	●	Animation	
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	●
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	●
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 69.6%

Read and Write Gold 8: Support for Strategic Networks

The same reading support tools under recognition networks are also utilized by

the students when interacting with the content, organizing their thoughts, and

demonstrating learning. Read and Write Gold 8 interacts with web sites in a way that

supports CLD students as they research and gather information. Highlighting tools appear as an additional tool bar in MS Word and allow students to select text, highlight it in different colors to indicate categories or levels of importance, and extract the highlighted information into a separate document as notes. This supports students in note taking, creating outlines of texts, or preparing and organizing for papers or presentations.

Read and Write Gold 8 supports teacher to student interactions. Teachers can create user groups and track students' progress in logs. Teachers can specify the level of support for each student. Teachers can customize which features are available, specify word lists for word prediction, and customize the dictionary by adding words. The student logs collect data on the time and duration a student logged into the system and tracks spelling errors. The list of spelling errors can be sent to MS word to enable the teacher to generate an individual spelling list for each student.

Read and Write Gold 8 also supports student to student interactions. A native Spanish-speaking student can be paired with a native English-speaking peer and the text reader and translator tool supports communication. Since Read and Write Gold 8 interfaces with other applications and the web, students can work together on a wide range of projects with Read and Write Gold 8 supporting the CLD students involved.

Read and Write Gold 8 supports speech recognition. Students can train a voice file which enables the computer to recognize their speech patterns. The student can dictate through a microphone and the computer will type their words. This feature supports CLD students whose oral language skills exceed their written language skills.

Table 4.18 shows the criteria for strategic networks and indicates which criteria

are supported by the features in Read and Write Gold 8.

Table 4.18

Read and Write Gold 8 Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers		Embed links to supports	●
Embed process support		Word prediction	●
Voice record process supports		Speech recognition	●
Embed learning strategies		Drawing/graphic tools	●
Embed self-monitoring		Voice recording	
Embed feedback		Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	●
Tracking of student progress	●		

Total Strategic Networks: 69% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

Read and Write Gold 8: Support for Affective Networks

Read and Write Gold 8 meets many of the criteria for supporting CLD students'

motivation and engagement with their learning. The ability to individualize the level of

challenge and support is important for CLD students as is the ability to accommodate

student choice and preferences. The only criterion not met in Read and Write Gold 8 is

the ability to embed feedback.

Table 4.19 shows the criteria for affective networks and indicates which criteria

are supported by the features in Read and Write Gold 8.

Table 4.19

Read and Write Gold 8 Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	
Student choice of content	●		

Total Affective Networks: 85.7%

Read and Write Gold 8: Conclusion

Read and Write Gold 8 is well designed to support CLD students with reading,

writing, and research. Some of the unique features of Read and Write Gold 8, such as the

translator, make it an attractive tool for use with CLD students in secondary content

classrooms.

SOLO

SOLO is created by the Don Johnston Company. SOLO is a reading, writing, information organizing, and research support application that merges four individual applications, ReadOutloud, WriteOutloud, DraftBuilder, and CoWriter, into one environment. Each of these four applications interfaces with the others in SOLO. They each can be used as stand alone applications as well.

SOLO is designed to support students throughout the entire research to writing process. Beginning with research, SOLO's text reader enables students to read digital text, highlight specific passages or vocabulary, and extract the highlighted text into a separate window. Teachers can embed process and learning strategy suggestions. SOLO is very customizable for each individual student allowing the teacher to create specific assignments or guidelines as needed.

SOLO allows the computer screen to split and show the digital text being read on one side of the screen and the teacher prompts, questions, or instructions on the other side of the screen. Students can highlight information in the text which automatically appears on the other side. For example, a teacher may ask, "What is the setting of this poem?" This question appears on the right side of the divided screen in a separate window. Students can read or listen to the digital text version of the poem, which is on the left side of the divided screen, highlight any words or phrases which describe the setting of the poem, and the highlighted words or phrases will appear under the question on the right side of the screen. The information thus gathered or, as in the example cited above, the

answers to the questions can then be transferred to a writing process tool called

DraftBuilder, by clicking on the DraftBuilder button on the toolbar.

DraftBuilder was created before SOLO as a stand alone writing process tool. It

can operate inside or outside of the SOLO environment and supports three stages of the

writing process; outlining, note taking, and composing a rough draft. DraftBuilder allows

the students to continue to develop their own ideas utilizing the information they gathered

from the reading as well as gathering more information as needed.

The word processing portion of SOLO, WriteOutloud, supports students through

the rest of the writing process. Students continue with editing and revising. Notes taken

during the research process are readily available for support or as direct quotations.

CoWriter, the word prediction component of SOLO, interfaces with each of the other

components as needed.

SOLO: Discussion of Findings

SOLO meets the criteria for software use in supporting CLD students' literacy

development in several areas. SOLO scores 47.8% for recognition networks support,

65.5% for strategic networks support, and 100% for affective networks support.

SOLO: Support for Recognition Networks

Teachers can use SOLO to present content in a supportive environment. SOLO

allows the teachers to collect and store documents which can be accessed and

manipulated in SOLO. Teachers can present information by accessing PDF files or RTF

documents stored on the computer or by locating web based text and downloading it into

SOLO. SOLO is particularly well suited to scaffolding the research to writing process.

Teachers can demonstrate the process using SOLO and then support students through their own research to writing process. SOLO's text reader reads English text and has English dictionary support. The ability to read text in languages other than English would make SOLO a more attractive tool for use with CLD students.

Table 4.20 shows the criteria for recognition networks and indicates which criteria are supported by the features in SOLO.

SOLO: Support for Strategic Networks

SOLO's strengths lie in its abilities to scaffold processes. Teachers can embed supports, scaffold assignments, and control which features or supports are available for students. The supports and notes are not embedded into text as with other writing support software but are displayed in a split screen format.

As the students proceed through their projects, the original questions or directions from the teacher appear in yellow highlighted text while the students' writing appears in normal text. Students can then proceed to complete their written project with the supports still visible to guide them. In addition to a text reader and word prediction, all of the usual word processing tools are available.

Teachers can monitor progress and manage student accounts. SOLO tracks individual student's use of words; the length of the words, the frequency of low usage words, and the length of sentences used in writing. The data is displayed in graph and table format.

Table 4.21 shows the criteria for strategic networks and indicates which criteria are supported by the features in SOLO.

Table 4.20

SOLO Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	
TR: Voice choice	●	Video: Import and embed	
TR: Voice modification	●	Video: Embed links	
Highlights as reads	●	Audio: Playback	
Multiple languages		Audio: Import and embed	
Convert files to MP3		Audio: Embed links	
Convert print to digital format		Animation	
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	●
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	●
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 47.8%

SOLO: Support for Affective Networks

SOLO allows teachers to create individual levels of support or challenge for CLD students. It also supports student choice of content, learning context, and the tools and features to support their work. SOLO is particularly helpful in scaffolding the writing

Table 4.21

Solo Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers	●	Embed links to supports	
Embed process support	●	Word prediction	●
Voice record process supports	●	Speech recognition	
Embed learning strategies	●	Drawing/graphic tools	
Embed self-monitoring	●	Voice recording	
Embed feedback	●	Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	
Tracking of student progress	●		

Total Strategic Networks: 65.5% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

process which enables students to work more independently while still receiving the support they need to feel successful. SOLO is an effective tool for supporting CLD students as they research, organize, and create written projects.

Table 4.22 shows the criteria for affective networks and indicates which criteria are supported by the features in SOLO.

Table 4.22

SOLO Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		

Total Affective Networks: 100%

SOLO: Conclusion

SOLO is unique among the software in this assessment in that it is a supportive

environment encompassing four separate applications which can be used in a sequential

manner or individually. SOLO focuses primarily on process support. Teachers can use

SOLO to scaffold the research to writing process for CLD students.

Thinking Reader

Thinking Reader was developed by the Center for Applied Special Technology

(CAST) and is produced by Tom Snyder Productions. Thinking Reader is designed to

support and enhance reading comprehension using authentic juvenile fiction in a

supported reading environment. Seven research-based reading strategies are included in

Thinking Reader: summarizing, questioning, clarifying, predicting, visualizing, feeling,

and reflecting. These strategies are embedded into digital text which can be read to the

student using human or digitized voices.

Thinking Reader is designed to be individualized to the student's unique needs,

thus allowing the student to work within his or her zone of proximal development (ZPD).

The ZPD consists of the range of skills between what a student can accomplish

independently and what they are working on with support (Vygotsky, 1978). Students are

prompted at various places within the text to review, reflect, and record their thoughts

and apply other reading strategies to enhance comprehension. Strategy hints, which open

up definitions of the strategies and give students ideas of how and when to use the

strategy, are embedded in the text and teachers can set the level of support individually

for students. Some students may be required to answer the strategy questions before

moving on and others may be given the choice to come back and answer later.

The glossary includes definitions in Spanish as well as in English, and some

definitions are picture supported. Student work is collected in work logs which the

teacher can access and from which reports can be generated.

The literature choices come from authentic copyrighted literature commonly used

in early secondary and late elementary classrooms: *Experanza Rising* by Katherine

Patterson, *Tuck Everlasting* by Natalie Babbitt, *Roll of Thunder, Hear My Cry* by Mildred

D. Taylor, *Dragonwings* by Laurence Yep, *My Brother Sam is Dead* by James Collier

and Christopher Collier, *A Wrinkle in Time* by Madeleine L'Engle, *The Giver* by Lois

Lowry, *Bud, Not Buddy* by Christopher Paul Curtis and *Bridge to Terabithia* by

Katherine Paterson.

Thinking Reader: Discussion of Findings

Thinking Reader is designed to support reading and comprehension of authentic literature. Thinking Reader also supports communication of students' responses to the literature. The results of this evaluation show that Thinking Reader meets many of the criteria for software use in supporting CLD students' literacy. Thinking Reader scores 60.9% for recognition networks support, 65.5% for strategic networks support, and 100% for affective networks support.

Thinking Reader: Support for Recognition Networks

Thinking Reader is unique among the software included in this evaluation in that it is designed to support and enhance reading comprehension using authentic literature. All of its features are directed toward this purpose. For example, the text reader reads the literature and any responses the students create inside of Thinking Reader, but the text reader cannot read other sources of digital print. Nonetheless, Thinking Reader is effective in supporting the presentation and acquisition of content as it relates to the specific literature choices.

Thinking Reader has several features which meet the criteria for supporting recognition networks. The glossary is particularly effective in Thinking Reader because, in addition to English definitions, it provides picture support for some words as well as Spanish definitions. Thinking Reader comes with audio and animation clips which support students' concept development and understanding of the assigned tasks.

Table 4.23 shows the criteria for recognition networks and indicates which criteria are supported by the features in Thinking Reader.

Table 4.23

Thinking Reader Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	
Text reader (TR)	●	Video: Playback	
TR: Voice choice	●	Video: Import and embed	
TR: Voice modification	●	Video: Embed links	
Highlights as reads	●	Audio: Playback	●
Multiple languages		Audio: Import and embed	
Convert files to MP3		Audio: Embed links	
Convert print to digital format		Animation	●
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.	●	Highlight and extract	●
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	●
Gloss/Dict/Thes: Pic. Support	●		

Total Recognition Networks: 60.9%

Thinking Reader: Support for Strategic Networks

Thinking Reader is particularly strong in providing strategy support. The animated and audio supported strategy hints can be set to a select number of difficulty levels so that teachers can customize the supports according to student need. As the

students progress in their use of reading strategies, the teacher can decrease the hints and supports until students are asked to choose an appropriate strategy on their own.

The quizzes built into Thinking Reader are designed around supporting the student's use of the reading strategies and comprehension of the book. This use of questions to prompt higher level thinking skills in a safe and supportive environment is a powerful feature of Thinking Reader. Students receive immediate feedback when taking the quizzes, thus supporting the need for embedded feedback. Thinking Reader is not designed to be a word processor but provides limited word processing tools for students to respond to prompts and take quizzes. Students also have the option to voice record answers.

Teacher and student interaction is supported in that all student work is kept in logs and teachers can organize and manage the logs. Various reports can be generated which give teachers different views of their students' progress. CLD students can successfully participate in literature groups by accessing the specific strategy supports provided in Thinking Reader.

Table 4.24 shows the criteria for strategic networks and indicates which criteria are supported by the features in Thinking Reader.

Thinking Reader: Support for Affective Networks

Thinking Reader allows teachers to customize the level of support and challenge for CLD students. These important criteria are advocated by both UDL and the SIOP. The students' engagement and motivation are encouraged by the use of the animated and audio-supported strategy hints and prompts.

Table 4.24

Thinking Reader Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers		Embed links to supports	
Embed process support	•	Word prediction	
Voice record process supports		Speech recognition	
Embed learning strategies	•	Drawing/graphic tools	
Embed self-monitoring	•	Voice recording	•
Embed feedback	•	Integrate comm. skills	•
Student/student interactions	•	Integrate 3 comm. skills	•
Student/teacher interactions	•	Integrate 4 comm. skills	•
Tracking of student progress	•		

Total Strategic Networks: 65.5% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

The animated characters give examples of how they would respond to questions to further encourage students in developing the strategy skills. Table 4.25 shows the criteria for affective networks and indicates which criteria are supported by the features in Thinking Reader.

Table 4.25

Thinking Reader Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		
		Total Affective Networks: 100%	

Thinking Reader: Conclusion

While Thinking Readers' specific focus affects the scores in this evaluation, it nonetheless will be an effective tool for use with CLD students who are expected to read any of the above mentioned literature. The reading scaffolds and reading strategy supports strengthen CLD students' comprehension of the literature and increase students' ability to participate in discussions and analysis of the literature.

WYNN Wizard 5

WYNN Wizard 5 is created by Freedom Scientific: Learning Systems Group. WYNN Wizard 5 is a literacy support application for reading and writing. WYNN Wizard 5 includes optical code recognition (OCR) software which supports scanning printed material and converting it to digital text. WYNN Reader, another version of the WYNN software, has all the capabilities of WYNN Wizard 5 except scanning.

The tool palettes for WYNN Wizard 5 are color coded and easily maneuvered to assist students in choosing the appropriate tool for a specific task. The blue toolbar includes tools for file management. The green toolbar is for reading styles and includes tools such as line spacing, word spacing, pacing of reading, print size, and rate of reading. The pink toolbar includes study support tools such as highlighting, recording voice notes, adding written notes or bookmarks, word spelling, and dictionary or thesaurus. The yellow tool bar includes writing support tools such as those typically found in word processors but also includes word prediction, help with homophones, and outlining.

WYNN Wizard 5's text reader supports a variety of languages and reads PDF, text files, and web based text. WYNN Wizard 5 includes study skills tools, such as highlighting to extract information for notes or outlines, and the ability to embed notes and bookmark specific locations in the text. Files can be saved as audio files so that students can listen to documents on portable MP3 players. WYNN Wizard 5 includes a comprehensive set of reading, writing, and study skills tools which make it a strong match with the criteria for supporting CLD students' literacy development.

WYNN Wizard 5: Discussion of Findings

WYNN Wizard 5 meets the criteria for supporting CLD students' literacy development in several areas. It is designed to scaffold the reading and writing process, from print, digital, and web based sources. WYNN Wizard 5 scores 65.2% for recognition networks support, 75.9% for strategic networks support, and 100% for affective networks support.

WYNN Wizard 5: Support for Recognition Networks

WYNN Wizard 5 can be used to present content and support student acquisition of key information and vocabulary. WYNN Wizard 5's text reader supports multiple languages, and the voice can be modified to support individual student needs and preferences. WYNN Wizard 5 includes buttons on the toolbars to adjust the rate of reading as well as the amount of space between lines, between words, and the size of the margins. This feature, when combined with highlighting the words as they are read, supports students in tracking. The ability to save files as audio files allows students to listen to the text being read on portable MP3 players. This allows students to listen to the text, whether a text book or other digital text, while reading along with the print version when away from a computer.

Both teachers and students will benefit from using WYNN Wizard 5 to support the presentation and acquisition of content. WYNN Wizard 5 converts print documents to digital format. This allows teachers to transfer content from any print source they typically use into a format that allows CLD students to access the language support they need if the printed text exceeds their academic language level. This includes textbooks as well as articles, handouts, and other supplementary print materials common to secondary content classrooms.

Table 4.26 shows the criteria for recognition networks and indicates which criteria are supported by the features in WYNN Wizard 5.

Table 4.26

WYNN Wizard 5 Recognition Networks

Criteria	Meets criteria	Criteria	Meets criteria
Lang./Cont. Objectives	●	Graphics, pictures or photos	●
Text reader (TR)	●	Video: Playback	
TR: Voice choice	●	Video: Import and embed	
TR: Voice modification	●	Video: Embed links	
Highlights as reads	●	Audio: Playback	●
Multiple languages	●	Audio: Import and embed	
Convert files to MP3	●	Audio: Embed links	
Convert print to digital format	●	Animation	
Glossary/Dictionary/Thesaurus	●	Highlight critical features	●
Gloss/Dict/Thes: Mult. Lang.		Highlight and extract	●
Gloss/Dict/Thes: Read Defin.	●	Highlight to mark location	●
Gloss/Dict/Thes: Pic. Support			

Total Recognition Networks: 65.2%

WYNN Wizard 5: Support for Strategic Networks

WYNN Wizard 5's strengths lie in its abilities to scaffold reading and writing as students complete assignments and projects that are customizable to their individual needs and preferences. Lacking only speech recognition, graphic and drawing tools, or

the ability to support graphic organizers, WYNN Wizard 5 meets most of the criteria for supporting CLD students. Teachers can easily embed notes, either written or voice recorded, as scaffolds for students. Students can embed written or voice recorded notes to support analysis and comprehension of the text. The literacy support tools in WYNN Wizard 5 are especially helpful for secondary CLD students who are likely to encounter text at a level beyond their English academic language learning level.

WYNN Wizard 5 has many features which meet the criteria for supporting students' interaction with the content and demonstration of learning. The highlighting features of WYNN Wizard 5 allow students to mark text and extract words, sentences, or entire phrases to a new document as notes. This supports students in outlining text and creating study aids. WYNN Wizard 5 includes dictionary support so CLD students can click on any word for which they need a definition. In addition to the usual palette of word processing tools, WYNN Wizard 5 includes word prediction.

WYNN Wizard 5's text reader reads multiple languages. CLD students paired with students who speak a different first language can use WYNN Wizard 5 to support interactions and communication.

Table 4.27 shows the criteria for strategic networks and indicates which criteria are supported by the features in WYNN Wizard 5.

WYNN Wizard 5: Affective Networks

WYNN Wizard 5 shows a 100% match with the criteria for affective networks support. CLD students can choose content and learning context using WYNN Wizard 5. Teachers can adjust the level of support or challenge provided in WYNN Wizard 5 for

Table 4.27

WYNN Wizard 5 Strategic Networks

Criteria	Meets criteria	Criteria	Meets criteria
Graphic organizers		Embed links to supports	●
Embed process support	●	Word prediction	●
Voice record process supports	●	Speech recognition	
Embed learning strategies	●	Drawing/graphic tools	
Embed self-monitoring	●	Voice recording	●
Embed feedback	●	Integrate comm. skills	●
Student/student interactions	●	Integrate 3 comm. skills	●
Student/teacher interactions	●	Integrate 4 comm. skills	
Tracking of student progress			

Total Strategic Networks: 75.9% [a]

[a] Score for strategic networks includes score for reading scaffold questions from recognition networks. See assessment example in Appendix A, page 116.

any student. Table 4.28 shows the criteria for affective networks and indicates which criteria are supported by the features in WYNN Wizard 5.

WYNN Wizard 5: Conclusion

Teachers and students will both benefit from using WYNN Wizard 5. Its comprehensive literacy support tools are a strong match for the criteria for effective software use in supporting CLD students' literacy development. The flexibility and

Table 4.28

WYNN Wizard 5 Affective Networks

Criteria	Meets criteria	Criteria	Meets criteria
Adjustable levels of challenge	●	Choice of learning context	●
Adjustable levels of support	●	Choice of features/tools	●
Student choice	●	Embed feedback	●
Student choice of content	●		
		Total Affective Networks: 100%	

comprehensive features built into WYNN Wizard 5 make it a useful tool for CLD

students in secondary content classrooms.

<div align="center">Conclusion</div>

Teachers who work with CLD students in secondary content classrooms will

discover that the nine applications evaluated in this project have many applicable features

for supporting their CLD students' literacy development. The applications are similar in

many ways, yet each has its unique set of features which permit it to function differently

from the others. The choice of software becomes a matter of the objectives the teacher

wishes to meet.

Teachers looking to create or provide activity based learning for the CLD students

in their classrooms should look at Clicker 5 and Classroom Suite. Both are high powered

multimedia authoring tools. They each work differently and the activities themselves will

look different, depending upon which software is used to create the activities. But similar objectives can be met using either.

Teachers looking to support reading and writing should look at WYNN Wizard 5, Kurzweil 3000, Read and Write Gold 8, and SOLO. Each of these software applications provides support for reading, writing, and research. Among these four, Kurzweil 3000 and WYNN Wizard 5 are the most similar. Kurzweil 3000, however, includes the ability to scan tests, both teacher-created and standardized, worksheets, and forms. Read and Write Gold 8 is designed to work in conjunction with other applications, such as MS Word, and is evaluated along with MS Word in this project. SOLO is unique in its design because it structures the research to writing process and works with documents which teachers manage from inside of SOLO.

Teachers looking for an organizational, research, and project support tool should consider Inspiration 8. It is very easy to use and is appropriate for use across the content areas. It does not include word processing tools but its ability to present content in the form of graphic organizers is very beneficial to CLD students.

Teachers who use the authentic literature titles that Thinking Reader supports should find Thinking Reader a very effective tool for supporting the CLD students in their classrooms. The reading strategy support and focus on comprehension that is inherent in Thinking Reader will support skill development that should transfer to other reading tasks CLD students will encounter.

CLD students who are educated in secondary content classrooms benefit from a variety of supports to enhance their academic language and literacy skills. With the

exception of MS Word used alone, the software evaluated in this project will provide

teachers and students with technology tools not commonly used with CLD students. The

needs are as diverse as the CLD students themselves. The possibilities for supporting

students' literacy development are only limited by the imaginations of those using these

tools.

Table 4.29 is a summary of all the criteria and indicates which criteria are met for

each software application.

Table 4.29

Summary and Comparison

	Classroom Suite	Clicker 5	Inspiration 8	Kurzweil 3000	Ms Word	Read & Write Gold 8	SOLO	Thinking Reader	WYNN Wizard 5
Recognition Networks									
Lang./Cont. Objectives	•	•	•	•	•	•	•	•	•
Text Reader (TR)	•	•	•	•	•	•	•	•	•
TR: Voice choice	•	•	•	•		•	•	•	•
TR: Voice modification	•	•		•		•	•	•	•
Highlights as reads	•	•		•		•	•	•	•
Multiple languages	•	•	•	•		•			•
Convert files to MP3				•		•			
Convert digital format				•		•			•
Gloss./Dictionary/Thesaurus			•	•	•	•	•	•	•
Gloss/Dict/Thes: Mult. Lang.				•				•	
Gloss/Dict/Thes: Read Defin.			•	•	•	•	•	•	•
Gl./Dic./Thes.: Pic. Support	•							•	
Graphics, pictures or photos	•	•	•	•	•	•	•		•
Video: Playback	•	•	•						
Video: Import and embed	•	•	•						
Video: Embed links	•	•	•		•	•			
Audio: Playback	•	•	•	•				•	•
Audio: Import and embed	•	•	•						
Audio: Embed links	•	•	•		•	•			
Animation	•	•	•					•	
Highlight critical features	•	•	•		•	•	•	•	•
Highlight and extract	•			•		•	•	•	•
Highlight to mark location	•			•		•	•	•	•
Strategic Networks									
Graphic Organizers	•	•	•				•		
Embed Process support	•	•	•	•			•	•	•
Record process supports	•	•	•	•			•		•
Embed learning strategies	•	•	•	•			•	•	•
Embed self-monitoring	•	•	•	•			•	•	•
Embed feedback	•	•	•	•			•	•	•
Student/student interactions	•	•	•	•	•	•	•	•	•
Student/teacher interactions	•	•	•	•	•	•	•	•	•
Tracking of student progress	•			•		•	•	•	
Embed links to supports	•	•	•	•	•	•			•
Word prediction	•			•		•	•		•
Speech Recognition					•	•			
Drawing/graphic tools	•		•		•	•			
Voice recording	•	•	•	•	•			•	•
Integrate comm. skills	•	•	•	•	•	•	•	•	•
Integrate 3	•	•	•	•	•	•	•	•	•
Integrate 4	•	•	•	•	•	•		•	
Affective Networks									
Adjustable levels of challenge	•	•	•	•		•	•	•	•
Adjustable levels of support	•	•	•	•		•	•	•	•
Student choice	•	•	•	•	•	•	•	•	•
Student choice of content	•	•	•	•	•	•	•	•	•
Choice of learning context	•	•	•	•	•	•	•	•	•
Choice of features/tools	•	•	•	•	•	•	•	•	•
Embed feedback	•	•	•	•			•	•	•

CHAPTER V

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

This project evaluates literacy support software based upon the criteria from two

distinct sources. One set of criteria comes from a research and field tested effective

approach to sheltered instruction for CLD students. The Sheltered Instruction

Observation Protocol (SIOP) is a tool for preparing and implementing effective lessons

with CLD students. Attending to the specific criteria as outlined in the SIOP enables

teachers to address CLD students' need for acquiring content while simultaneously

developing English literacy.

The other set of criteria comes from Universal Design for Learning (UDL). UDL

is a theoretical approach to designing curriculum with the full scope of student needs in

mind so as to create the most accessible curriculum with the least amount of barriers.

The criteria from both the SIOP and UDL are combined into the Literacy Support

Software Evaluation Protocol (LSSEP). The LSSEP is applied to nine software

applications. The results of the evaluation are presented in detailed discussions of the

software as they relate to the criteria as well as in tables indicating which features of the

individual software applications meet the criteria. A further result of this project is the

LSSEP itself which can be applied to other software applications.

Conclusion

As seen in Chapter II, the needs of CLD secondary students are not met in most

educational settings. The reality these students face can be challenging and even

discouraging. There is a gap between their need to master content to achieve parity with their native English-speaking peers and their ability to do so because of the barriers to accessing the curriculum that often exist in secondary content classrooms.

The field of assistive technology holds possibilities for bridging the gap that CLD students experience. The software applications evaluated in this project have many features which provide teachers and CLD students with tools well matched to a diverse range of literacy needs.

It is insupportable that CLD students are handed high school and college level content textbooks in educational settings without being given the tools they need to access the content in those texts. In today's media and digital world, there are alternatives to choosing one text book for a class and using that as the curriculum. A text book should be viewed as one source of curriculum rather than as the only source of curriculum. Publishers are developing digital versions of textbooks and states are moving toward adoption policies which require the availability of digital textbooks for specific populations. With time, hopefully, that availability will be extended to any student for whom the text book presents a barrier to accessing the curriculum.

Designing curriculum, as advocated by UDL, with all students' needs in mind, including language needs, is a step in the right direction toward providing improved educational opportunity for CLD students. Given a few specialized technology tools, such as the applications evaluated in this project, as well as the perspective of curriculum design rather than curriculum modification, teachers will be able to readily adapt that

which they already do to a more accessible format for the CLD students in their classrooms.

Recommendations

As the LSSEP is used, it may be necessary to change some of the language of the questions or the comments. The researcher learned that it is necessary to understand the software rather thoroughly in order to answer all the questions. It may be necessary to modify the LSSEP to include more detailed explanations of the questions or to include examples of the feature so as to more clearly communicate the intent of the question to individuals less familiar with the software being evaluated. Nonetheless the LSSEP has potential for being effective in supporting CLD teachers as they search for technology solutions for their CLD students and should be made widely available for teachers.

There are many software applications available beyond those covered in this project. The software applications evaluated in this project may be revised or replaced by their manufacturers within a short period of time. The world of technology is always changing and developing new products and ideas. The LSSEP can be used in any of these scenarios. Teachers will find the LSSEP helpful in evaluating other software applications they are considering for use with CLD students. Most importantly, teachers will find the specific software applications evaluated in this project well worth the time to delve into and utilize with CLD students.

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Appendix A

The Literacy Support Software Evaluation Protocol

The Literacy Support Software Evaluation Protocol
Software Title:
_____

Recognition Networks: Presentation/Acquisition of Content

DOES THE SOFTWARE...........

Language AND Content Objectives

Provide means for language AND content objectives to be communicated?

Reading Scaffolds and Vocabulary Development

Include a text reader? (text-to-speech)

    Provide voice choices?

    Allow modification of the speech (pitch, rate)?

    Highlight words, phrases or sentences as it reads?

    Speak/Read more than one language?

    Convert files to format which can be exported and played on MP3 players?

Allow for conversion of printed text to digital format?

Include a glossary, dictionary and/or thesaurus?

    Include definitions in language(s) other than English?

    Speak/Read definitions?

    Provide picture support for the definitions?

Allow inclusion of graphics/pictures/photographs?

Multiple means of representation: Video

Include and play video?

Allow video to be imported, embedded, and linked to graphics, text, buttons, or objects?

Allow video to be accessed via graphics, text, buttons, or objects which are linked to
    outside sources such as other programs, files, or the internet?

Multiple Means of Representation: Audio

Include and play audio files?

116

Allow audio to be imported, embedded, and linked to graphics, text, buttons, or objects?

Allow audio to be accessed via graphics, text, buttons, or objects which are linked to

     outside sources such as other programs, files, or the internet?

Multiple Means of Representation: Animation

Include and play animation?

Multiple Means of Representation: Graphics/pictures/photographs

Include graphics/pictures/photographs?
    Already addressed under Reading Scaffolds and Vocabulary Development above.

Highlighting Critical Features

Include tools which allow for emphasizing the critical concepts/vocabulary of the lesson?
    Include tools which permit highlighting and automatic extraction of words, sentences or paragraphs?
    Include tools which permit marking specific locations in the text?

TOTAL: RECOGNITION NETWORKS

Strategic Networks: Interaction with Curriculum and Expression and Presentation of Learning

DOES THE SOFTWARE............

Process and Learning Strategies.

Support/provide graphic organizers?

Include or allow embedded process support?

    Allow teacher to voice record embedded prompts?

Include or allow embedded learning strategies?

Include or allow embedded self-monitoring strategies/techniques?

Include or allow embedded ongoing/relevant feedback?

Grouping

Support student/student interactions?

Support student/teacher interactions?

Include tracking of student progress which teachers can access for each student?

Allow teachers to embed recorded or written prompts?
Question already addressed in process/learning strategies above.

Allow teachers to embed links to additional supports?

Reading Scaffolds
Questions already addressed under Recognition Networks: Reading Scaffolds.

Writing Scaffolds

Provide word prediction?

Convert student's speech into text?

Drawing Scaffolds

Provide drawing/graphics tools?

Speech/Oral Scaffolds

Include speech recognition? (text-to-speech)
Question already addressed under Reading Scaffolds above.

Allow voice recording?

4 Communication Skills Integration

Support/provide activities which integrate speaking, listening, reading, and/or writing skills?

Allow for integration of three skills?

Allow for integration of all four skills?

Expression/Presentation of Learning

Provide for flexible modes of expression?
Question already addressed under Reading, Writing, Drawing, Speech/Oral Scaffolds above.

TOTAL: STRATEGIC NETWORKS

Affective Networks: Motivation, Engagement

DOES THE SOFTWARE...........

Student Choice/ Individualization

Provide/support adjustable levels of challenge?

Provide/support adjustable levels of support?

Support student choice?

Provide/support choice of content?

Provide/support choice of features/tools?

Provide/support choice of learning context?

Provide ongoing, relevant feedback?

Question already addressed under strategy support.

TOTAL: AFFECTIVE NETWORKS

Appendix B

Literacy Support Software Evaluation Protocol Comments

Cell: Recognition Networks (A3).

Comment: Recognition networks are neural networks which permit recognition of

essential patterns. Presentation of learning content should incorporate

multiple, flexible methods, materials and media (UDL). CLD students

benefit from the presentation of essential content by means of a variety of

techniques and materials (SIOP). The evaluation of literacy support software

under the category Recognition Networks: Presentation and Acquisition of

Content focuses on the software's ability to present content and assist

students in recognizing essential patterns in a variety of ways while

supporting the various language proficiency, developmental, and cognitive

stages of the students.

Cell: Language and Content Objectives (A6).

Comment: CLD students benefit from objectives for both content and English language

skills in all lessons (SIOP).

Cell: Text reader (A9).

Comment: Integration of listening and reading skills supports CLD students'

comprehension and vocabulary development (SIOP) as well as individual

needs (UDL).

Cell: Voice choice (A10).

Comment: CLD students benefit from clear and easily understood voices (SIOP).

Choice of voices supports individual students' needs and preferences

(UDL).

Cell: Modification of speech (A11).

Comment: Modification of the voice supports individual students' needs and

preferences (UDL) and supports CLD students' comprehension (SIOP).

Cell: Highlights as it reads (A12).

Comment: Integration of reading and listening skills is supported by highlighting of

text as it is read and supports CLD students' ability to connect to

background knowledge and prior learning (SIOP, UDL).

Cell: Read more than English (A13).

Comment: Language choice other than English provides L1 support for L2

development as well as supports CLD students' ability to connect to

background knowledge and prior learning (SIOP, UDL).

Cell: Convert to audio files (A14).

Comment: Audio files can be exported and played on portable MP3 players allowing

CLD students to listen to any document (i.e. digital text books or research

articles, etc.) anywhere they have access to a portable devise (MP3). This

supports individual student need and preferences (UDL) and scaffolds

comprehension (SIOP).

Cell: Convert print text to digital text (A16).

Comment: Printed text can be scanned into the software to create digital text which can

then be read to the student or manipulated and edited utilizing the software

features thus creating flexible materials which support individual student's

needs (UDL).

Cell: Dictionary, Thesaurus or Glossary (A18).

Comment: A glossary, dictionary or thesaurus supports CLD students' comprehension

and vocabulary development (SIOP), connection to background knowledge

and prior learning (SIOP, UDL), and supports individual needs (UDL).

Cell: Definitions in other languages (A 19).

Comments: Definitions in CLD students' first language supports connections to

background knowledge and prior learning, vocabulary development, and

comprehension (SIOP) as well as supports individual needs (UDL).

Cell: Text reader reads definitions (A 20).

Comment: Integration of listening and reading skills supports CLD students'

comprehension and vocabulary development (SIOP) as well as individual

needs (UDL).

Cell: Pictorial dictionary (A21).

Comment: A pictorial dictionary gives both the definition and a picture representation

of the word. Pictorial representations act as scaffolds to support CLD

students' comprehension and vocabulary development as well as supports

individual needs (SIOP, UDL).

Cell: Pictures, photographs, graphics (A23).

Comment: CLD students benefit from pictures or graphics to support comprehension, vocabulary and concept development, as well as to form connections to background knowledge and prior learning (SIOP, UDL). Software includes a graphics library or allows pictures or graphics to be imported.

Cell: Multiple means of representation: Video (A25).

Comment: Video clips support CLD students' vocabulary and concept development (SIOP), connections to background knowledge, and prior learning (SIOP, UDL) and supports individual needs (UDL).

Cell: Video playback (A26).

Comment: Video included with the software is designed to support concept development and background information (SIOP, UDL).

Cell: Import and embed video (A28).

Comment: CLD students benefit from connection of the video clip to the concept, idea, vocabulary, or activity. This supports vocabulary and concept development, connections to background knowledge and prior learning, emphasis of the most important features, concepts or ideas (SIOP, UDL), as well as supports individual needs and preferences (UDL).

Cell: Embed links to outside sources of video (A31).

Comment: CLD students benefit from connection of the video clip to the concept, idea, vocabulary, or activity. This supports vocabulary and concept development, connections to background knowledge and prior learning, emphasis of the

most important features, concepts or ideas (SIOP, UDL) as well as supports

individual needs and preferences (UDL).

Cell: Audio playback (A34).

Comment: Audio supports CLD students' vocabulary and concept development,

connections to background knowledge, and prior learning (SIOP, UDL), as

well as individual needs and preferences (UDL).

Cell: Import and embed audio (A36).

Comment: CLD students benefit from connection of the audio clip to the concept, idea,

vocabulary, or activity. This supports vocabulary and concept development,

connections to background knowledge and prior learning, emphasis of the

most important features, concepts, and ideas (SIOP, UDL) as well as

individual needs and preferences (UDL).

Cell: Embed links to outside audio sources (A39).

Comments: CLD students benefit from connection of the audio clip to the concept, idea,

vocabulary, or activity. This supports vocabulary and concept development

(SIOP), connections to background knowledge and prior learning, emphasis

of the most important features, concepts, and ideas (SIOP, UDL) as well as

individual needs and preferences (UDL).

Cell: Animation (A42).

Comment: Animation supports CLD students' vocabulary and concept development

(SIOP), connections to background knowledge and prior learning (SIOP,

UDL), and individual needs and preferences (UDL).

Cell: Highlight critical features (A49).

Comment: CLD students benefit from emphasis of the most important aspects of the concept, vocabulary, or task to be learned (SIOP, UDL).

Cell: Highlight and automatically extract (A50).

Comment: Highlighting important concepts and then extracting the highlighted text into a separate note's or outline page supports CLD students' vocabulary and concept development (SIOP) study skills and individual needs (UDL).

Cell: Mark specific locations in text (A51).

Comment: Marking the text permits students to return to key passages, concepts, or vocabulary and supports CLD students' concept and vocabulary development (SIOP), as well as study skills and individual needs (UDL).

Cell: Strategic Networks (A51).

Comment: Strategic networks are neural networks which plan, execute, and monitor the strategies employed to complete any task or activity. Lesson activities should support multiple flexible ways for students to interact with content and express and demonstrate learning (UDL). CLD students benefit from a variety of learning and process strategy scaffolds, various materials or media with which to practice essential skills and processes, as well as frequent and varied opportunities for interaction with the teacher and other students (SIOP). The evaluation of literacy support software under the category of Strategic Networks: Interaction with Curriculum and Expression/Demonstration of Learning focuses on the software's ability to

provide and support the following: Various learning strategies and processes, scaffolds for communication skills, scaffolds for expressions of learning, and group or individual settings.

Cell: Graphic organizers (A59).

Comment: Graphic organizers support CLD students' vocabulary and concept development, enable connections to background knowledge and prior learning, enable emphasis of key vocabulary and concepts, and support individual needs and preferences (SIOP, UDL).

Cell: Embedded process supports (A61).

Comment: Embedded process supports scaffold the steps to completion of any activity, project, or process (SIOP). Process supports allow for individualized scaffolding tailored to student's unique needs (UDL) and support connections to prior learning (SIOP, UDL).

Cell: Voice recorded prompts (A62).

Comment: Teacher-created recorded prompts enable individualized scaffolding tailored to students' unique needs (SIOP, UDL).

Cell: Embedded learning strategy prompts (A64).

Comment: Embedded learning strategy prompts provide scaffolds for CLD students to develop and utilize new learning strategies as well as connect to prior learning and background knowledge (SIOP, UDL).

Cell: Self-monitoring strategies (A66).

Comment: Self-monitoring techniques and strategies enable CLD student to take

greater control of their own learning and can enhance motivation and

engagement (UDL).

Cell: Embedded feedback (A68).

Comment: Ongoing, relevant feedback supports CLD students' progress in learning

(SIOP) and supports motivation and engagement (UDL).

Cell: Student interactions (A71).

Comment: Software can assist students in partnering with native English-speaking

peers or supporting more than one CLD student, either individually or in a

group setting (SIOP), and supports individual needs and preferences (UDL).

Cell: Student-teacher interactions (A73).

Comment: Student-teacher interactions supported by the software allow teachers to

support individual students with activities and curricula tailored to

individual student needs and preferences (SIOP, UDL).

Cell: Track student progress (A74).

Comment: Software allows teachers to monitor student responses, track progress, and

create individual accounts for each students (UDL).

Cell: Embed links to other supports (A77).

Comment: Links to additional materials, files, or web-sites scaffolds processes and

connects to prior learning and background knowledge (SIOP, UDL).

Cell: Word prediction (A83).

Comments: Word prediction software creates a word list for the student to choose from as the student types letters of any word. Word prediction supports CLD students' vocabulary development and scaffolds the students' written communication in English (SIOP, UDL).

Cell: Speech recognition (A85).

Comment: Speech recognition provides a scaffold for CLD students whose proficiency in spoken English exceeds their proficiency in written English. This alternative way to generate ideas in writing supports individual needs and preferences (SIOP, UDL).

Cell: Drawing scaffolds (A88).

Comment: Drawing scaffolds understanding and provides an alternative choice for demonstration of learning and supports individual needs and preferences (SIOP, UDL).

Cell: Voice recording (A94).

Comment: Voice recording provides a scaffold for CLD students whose proficiency in spoken English exceeds their proficiency in written English. This alternative way to communicate ideas supports individual need and preferences (UDL, SIOP).

Cell: Integration of reading, writing, speaking, listening (A97).

Comments: CLD students benefit from meaningful activities that integrate the four communication skills (SIOP).

Cell: Affective Networks (A106).

Comment: Affective networks are neural networks which control our emotions,

interests, and motivation. Learning activities and tasks should address

individual student differences and choices as these networks exert great

influence on students' motivation and engagement with learning tasks

(UDL). CLD students' motivation and engagement are highly affected by

the language and cultural differences they experience. CLD students benefit

from supportive environments and learning activities which support

individual choice, interest, background knowledge and experiences, as well

as prior learning (SIOP). The evaluation of literacy support software under

the category of Affective Networks: Motivation and Engagement focuses on

the software's ability to provide and support choice of content, tools with

which to demonstrate learning, the learning context, as well as provide

individualized levels of support and challenge based upon individual need

(UDL).

Cell: Level of challenge (A109).

Comment: Providing a level of challenge which is individualized for a student can

enhance motivation and engagement (UDL).

Cell: Level of support (A111).

Comment: Providing a level of support which is individualized for a student can

enhance motivation and engagement (UDL).

Cell: Student choice (A113).

Comment: Individual differences in motivation and engagement can be addressed by

allowing for appropriate levels of choice (UDL).

Cell: Choice of content (A114).

Comment: Choice of content for specific activities or projects can enhance student

motivation and engagement as well as accommodate individual needs and

preferences (UDL).

Cell: Choice of tools (A115).

Comment: Choice of tools with which to complete specific activities and projects can

enhance student motivation and engagement as well as accommodate

individual needs and preferences (UDL).

Cell: Choice of learning context (A116).

Comment: Choice of learning context (partners, individual, group, presentation, report,

etc.) for specific activities or projects can enhance student motivation and

engagement as well as accommodate individual needs and preferences

(UDL).

Appendix C

Software Vendors' Contact Information

Classroom Suite

Intellitools Corporate Headquarters

1720 Corporate Circle

Petaluma, CA 94954

Phone: (707) 773-2000

Toll-Free: 1 (800) 899-6687 (U.S. and Canada)

Web Site: www.intellitools.com

Clicker 5

Crick Software

14687 N.E. 95th Street

Redmond, WA 98052

Toll-free: 1-866-33-CRICK

Telephone: 425-467-8260

Web Site: www.cricksoft.com

Inspiration 8

Inspiration Software, Inc.

9400 SW Beaverton-Hillsdale Hwy, Suite 300

Beaverton, OR 97005-3300

Toll free: 800-877-4292

Web Site: www.inspiration.com

Kurzweil 3000

Kurzweil Educational Systems, Inc.

100 Crosby Drive

Bedford, MA 01730-1402

Phone: From the USA or Canada: 800-894-5374

From all other countries: 781-276-0600

Web Site: www.kurzweiledu.com

Microsoft Word

Microsoft Corporation

One Microsoft Way

Redmond, WA 98052-6399

Phone: (800) MICROSOFT (642-7676)

Web Site: www.microsoft.com

Read and Write Gold 8

Texthelp Systems Inc.

100 Unicorn Park Drive

Woburn, MA 01801

Toll free phone: 888-248-0652

Phone: 617-896-9704

Web Site: www.texthelp.com

SOLO

Don Johnston Incorporated

26799 West Commerce Drive

Volo, IL 60073

Phone: 800.999.4660- USA & CANADA

847.740.0749- USA & GLOBAL

Web Site: www.donjohnston.com

Thinking Reader

Tom Snyder Productions

100 Talcott Avenue

Watertown, MA 02472-5703

Phone: 800-342-0236

Web: www.tomsnyder.com

WYNN 5

Freedom Scientific, Learning Systems Group

480 S. California Avenue

Suite 201

Palo Alto, CA 94306-1609

Phone: (888) 223-3344

Web Site: www.freedomscientific.com

Appendix D

Summary Comparison Chart

Software

Legend: ■ Recognition Networks ■ Strategic Networks ■ Affective Networks