Just in Time Learning: Implementing Principles of Multimodal Processing and Learning for Education

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ABSTRACT

Baldi, a 3-D computer-animated tutor has been developed to teach speech and language. I review this technology and pedagogy and describe evaluation experiments that have substantiated the effectiveness of our language-training program, Timo Vocabulary, to teach vocabulary and grammar. With a new Lesson Creator, teachers, parents, and even students can build original lessons that allow concepts, vocabulary, animations, and pictures to be easily integrated. The Lesson Creator application facilitates the specialization and individualization of lessons by allowing teachers to create customized vocabulary lists *Just in Time* as they are needed. The Lesson Creator allows the coach to give descriptions of the concepts as well as corrective feedback, which allows errorless learning and encourages the child to think as they are learning. I describe the Lesson Creator, illustrate it, and speculate on how its evaluation can be accomplished.

Categories and Subject Descriptors

J.4 [**Psychology**]

General Terms

Performance, Design, Experimentation, Human Factors, Theory

Keywords

Speech, Language Learning, Vocabulary, Education, Multisensory Integration,

1. INTRODUCTION

In a previous ICMI paper [14], I provided both a theoretical and empirical framework for addressing the important issue of the presentation of multimodal displays to the user. The major assumption is that multiple sensory influences are continuously combined during perception, categorization, and language processing [12, 13]. Results from a variety of experiments on speech, emotion, and gesture have supported this type of framework for language processing [15]. This research and the challenges faced by many individuals in language learning encouraged us to develop and implement animated tutors.

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2. ANIMATED TUTORS

Baldi®[1], a 3-D computer-animated talking head, can be animated in real time on a commodity PC, and is able to say anything at any time in interactive applications. He provides realistic visible speech that is almost as accurate as a natural speaker [19]. (For examples of the visible speech animation, see, http://mambo.ucsc.edu/psl/international.html.) The goal in this paper is to review applications in language tutoring using this technology, propose a user-friendly Lesson Creator [11] that can be used to implement research and tutoring applications, and suggest how it can be evaluated more formally.

Several advantages of our technology and pedagogy include the popularity of interactive agents, instruction can be tailored exactly to the student's need, the ability to seamlessly meld spoken and written language, and provide a semblance of a game-playing experience [9] while actually learning. Incorporating text and visual images of the vocabulary to be learned along with the actual definitions and sound of the vocabulary facilitates learning and improves memory for the target vocabulary and grammar. Timo Vocabulary [26] makes it possible for the students to 1) Observe the words being spoken by a realistic talking interlocutor, 2) Experience the word as spoken as well as written, 3) See visual images of referents of the words, 4) Click on or point to the referent or its spelling, 5) Hear themselves say the word, followed by a correct pronunciation, and 6) Spell the word by typing, and 7) Observe and respond to the word used in context. Table 1 describes the 8 exercises and goals in the Timo Vocabulary application.

3. VOCABULARY LEARNING

Although there is no consensus on the best way to teach or to learn language, there are important areas of agreement about the psychology of language. One is the central importance of vocabulary knowledge for understanding the world and for language competence in both spoken language and in reading [7, 14, 25]. Empirical evidence indicates that very young children more easily form conceptual categories when category labels are available than when they are not [30]. Finally, vocabulary knowledge is positively correlated with both listening and reading comprehension [1] and predicts overall success in school [28]. For example, a child in the 25th percentile of language competence has a vocabulary of 6,000

[1] Baldi is a trademark of Dominic W. Massaro.

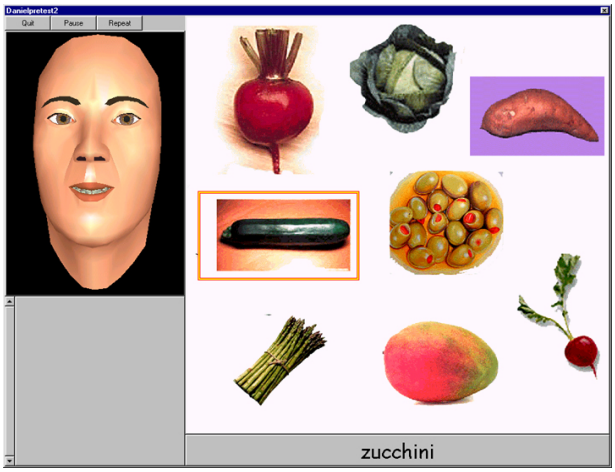

Figure 1. A screen from a vocabulary lesson on fruits and vegetables [18].

fewer words than a child in the 50th percentile. It follows that increasing the pervasiveness and effectiveness of vocabulary learning offers a huge opportunity for improving conceptual knowledge and language competence for all individuals, whether or not they are disadvantaged because of sensory limitations, learning disabilities, or social condition.

3.1 Direct Vocabulary Instruction

There are important reasons to justify the need for direct teaching of vocabulary. Research demonstrates that some direct teaching of vocabulary is essential for appropriate language development [2, 12, 20, 21, 22, 23]. Contrary to a common belief that learning vocabulary is a necessary outcome of reading in which new words are experienced in a meaningful context, context seldom disambiguates the meaning of a word completely. As an example, consider the passage from *The Fir Tree* by Hans Christian Andersen. "Then two servants came in rich livery and carried the Fir Tree into a large and splendid drawing-room. Portraits were hanging on the walls, and near the white porcelain stove stood two large Chinese vases with lions on the covers." Most of the words are not disambiguated by context. The meaning of *livery, portraits, porcelain,* and *vases*, for example, cannot be determined from the context of the story alone.

3.2 Graded Word Information

Knowing a word is not an all-or-none proposition. Acquiring adequate semantic representations appears to be a gradual process that can extend across several years. Qian [24] found that the dimension of vocabulary depth (as measured by synonymy, polysemy, and collocation) is as important as that of vocabulary size in predicting performance on academic reading. Thus, it is important to over-train vocabulary, and to present the items in a variety of contexts in order to develop rich representations. A student can profit tremendously from the repeated experience of practicing new words in multiple contexts during the direct teaching of vocabulary.

3.3 Need For Language Tutoring

The need for language tutoring is pervasive in today's world. There are millions of elementary school children who face language and speech challenges [27]. All of these groups have or are at high risk for language learning disabilities and require additional instruction in language learning. Currently, however, these needs are not being met in part because there are not enough skilled teachers and professionals to give them the one-on-one attention that they need. Other available resources, such as books or other media, are not easily personalized to the students' needs, lack the engaging capability of a teacher, and are relatively ineffective. To address this need, we developed a Vocabulary Tutor to provide direct instruction in vocabulary learning (3), which will be described next.

4. EFFECTIVENESS OF TUTORING

Several evaluation experiments with the Vocabulary Tutor have carried out with three different groups of children with language challenges: hard of hearing, autistic, and English learners.

4.1 Hard Of Hearing Children

We carried out an experiment based on a within-student multiple baseline design where certain words were continuously being tested while other words were being tested and trained [10]. Although the student's instructors and speech therapists agreed not to teach or use these words during our investigation, it is still possible that the words could be learned outside of the learning context. The single student multiple baseline design monitors this possibility by providing a continuous measure of the knowledge of words that are not being trained. Thus, any significant differences in performance on the trained words and untrained words can be attributed to the training program itself rather than some other factor.

We studied eight children with hearing loss, who needed help with their vocabulary building skills as suggested by their regular day teachers [18]. The experimenter developed a set of lessons with a collection of vocabulary items that was individually composed for each student. Each collection of items was comprised of 24 items, broken down into 3 categories of 8 items each. Three lessons with 8 items each were made for each child. Images of the vocabulary items were presented on the screen next to Baldi. (see Figure 1). Assessment without feedback was carried out on all of the items at the beginning of each lesson. It included identifying and producing the vocabulary item without feedback. Training on the appropriate word set, which included verbal feedback, followed this testing.

Figure 2 gives the results from one student in this study, because of the value of single-student analyses and the fact that this student was representative of all of the students tested. Identification accuracy was always higher than production accuracy, which is expected because a student would have to know the name of an item to pronounce it correctly. There was little knowledge of the test items without training, even though these items were repeatedly tested for many days. Once training began on a set of items, performance improved fairly quickly until asymptotic knowledge was obtained. This knowledge did not degrade after training on these words ended and training on other words took place. In addition, a reassessment test given about 4 weeks after completion of the experiment revealed that the students retained the items that were learned.

Table 1. The goals and descriptions of the eight exercises in Timo [11,26].

Exercise	*Goal*	*Description*
Pretest	*To determine pre-existing knowledge of the content prior to tutoring.*	*Student is prompted to select an image from a set of images corresponding the name or the description of a concept.*
Presentation	*To teach the visual images of the word or written words with the target vocabulary and/or descriptions.*	*An image or written word is highlighted and the name and or description of the image or word is given. The student is then prompted to click on this image or word to reinforce the association of the visual image or written word with the name or description.*
Identification	*To provide the student an opportunity to retrieve the target content.*	*The student is prompted to click on the image corresponding the name or the description of a concept. After the response reinforcing feedback is given to promote the learning process.*
Reading	*To allow the student to learn to read the written form of the target content.*	*The student is shown the images and the written names below the picture screen. An image is highlighted and the student is asked to click on the appropriate response alternative.*
Spelling	*To allow the student to learn to spell the written form of the target content.*	*The student is shown the images with a typing window below the picture screen. An image is highlighted and the student is asked to spell the appropriate response alternative.*
Imitation	*To allow the student to learn to imitate the spoken form of the target content.*	*An image is highlighted and the name and/or description of the image is pronounced. The student is then prompted to repeat the pronunciation. The student then hears her own pronunciation followed by the target pronunciation.*
Elicitation	*To allow the student to learn to elicit the spoken form of the target content.*	*An image is highlighted and the student is then prompted to say the name and or description of the image. The student then hears her own pronunciation followed by the target pronunciation.*
Posttest	*To determine knowledge of the content after or during tutoring.*	*Student is prompted to select an image from a set of images corresponding the name or the description of a concept.*

4.2 Autistic Children

The tutoring application has also been used in evaluating vocabulary acquisition, retention and generalization in eight children diagnosed with autism, ranging in age from 7-11 years. The results indicated that the children learned many new words, grammatical constructions and concepts, proving that the application provided a valuable learning environment for these children. In addition, a delayed test given more than 30 days after the learning sessions took place showed that the children retained over 85% of the words that they learned. This learning and retention of new vocabulary, grammar, and language use is a significant accomplishment for autistic children.

Although all of the children demonstrated learning from initial assessment to final reassessment, it is possible that the children were learning the words outside of our learning program (for example, from speech therapists or in their school curriculum). Furthermore, it is important to know whether the vocabulary knowledge would generalize to new pictorial instances of the words. To address these questions, a second investigation used the single subject multiple probe design, as was done in [3, 17]. Once a student achieved 100% correct, generalization tests and training were carried out with novel images. The placement of the images relative to one another was also random in each lesson. Assessment and training continued until the student was able to accurately identify at least 5 out of 6 vocabulary items across four unique sets of images.

Although performance varied dramatically across the children and across the word sets during the pre-training sessions, training was effective for all words sets for all children. Given training, all of the students attained our criterion for identification accuracy for each word set and were also able to generalize accurate identification to four instances of untrained images. The students identified significantly more words following implementation of training compared to pre-training performance, showing that the program was responsible for learning. Learning also generalized to new images in random locations, and to new interactions outside of the lesson environment. These results show that our tutoring program is effective for autistic children, as well for hard of hearing children.

4.3 English Language Learners

The study with English Language Learners (ELL) involved a recently-released application, Timo Vocabulary [26], which instantiated the pedagogy we found in our earlier research [3, 17]. Nine children ranging in age from 6-7 years were tested in the summer before first grade. Almost all of the children spoke Spanish in the home. Three different lessons were tested, corresponding to the three sets of items used in the multiple baseline design. Each child was pretested in order to find vocabulary that was unknown to him or her. A session on a given day included a series of three test lessons, and on training days, a training lesson on one of the three sets of words. The test session involved the presentation of the images of a given lesson on the screen with Timo's request to click on one of the items, e.g., Please click on the oven. No feedback was given to the child. Each item was tested once in two separate blocks to give 2 observations on each item. A training session on a given day consisted of just a single lesson in which the child was now given feedback on their response. Thus, if Timo requested the child to

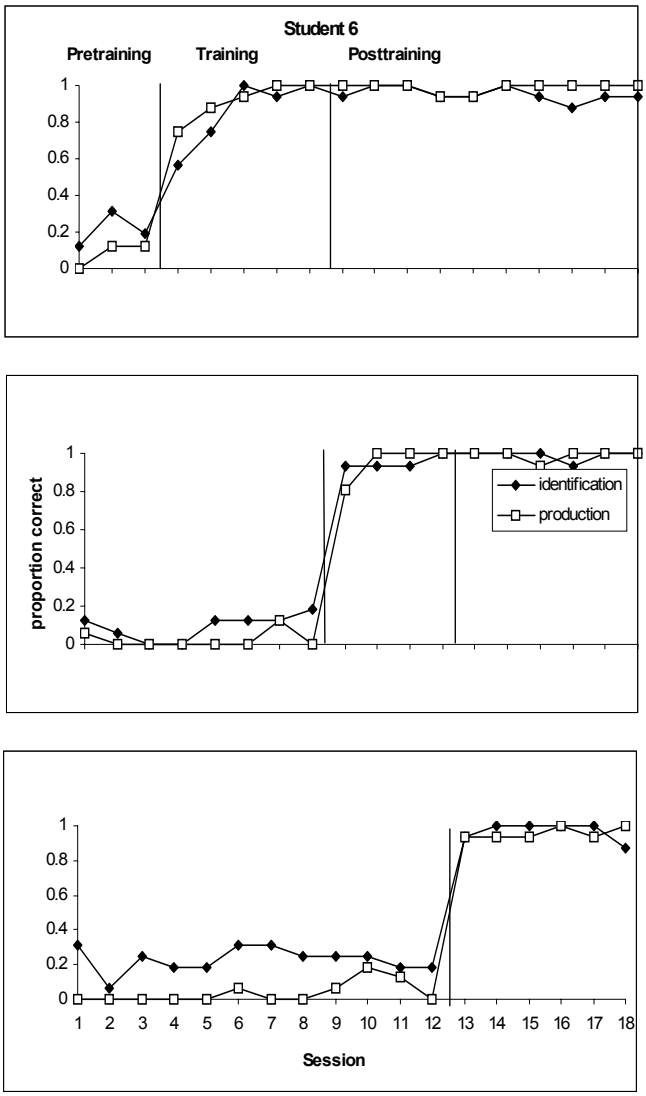

Figure 2. Proportion of correctly identified (black triangles) and correctly produced (white squares) items across the testing sessions, within each set of words, for student 6. The training occurred between the two vertical bars. The figure illustrates that very little change occurred in both Identification and Production in the Pre-training and Post-Training sessions, whereas learning occurred during the Training sessions [18].

click on the dishwasher and the child clicked on the spice rack, Timo would say, "I asked for the dishwasher, you clicked on the spice rack. This is the dishwasher. The training session also included the Elicitation and Imitation sections in which the child was asked to repeat the word when it was highlighted and Timo said it, and the child was asked to say the item that was highlighted. Thus, training proved to be effective in teaching English vocabulary to English language learners.

5. LESSON CREATOR

A new application, the Lesson Creator [11], adds flexibility and many new pedagogical features. Teachers, parents, and even students with minimal computer experience can build original lessons with personalized vocabulary and pictures. The program has Wizard-like features that direct the coach to explore and choose among the alternative implementations in the creation of a lesson. It allows the coach to tailor the lesson to the needs of the student, to seamlessly meld spoken and written language, bypass repetitive training when student responses indicate that material is mastered, provide a semblance of an interactive and engaging experience while actually learning, and to lead the child along a growth path that always bridges his or her current "zone of proximal development" [29]. If a teacher is taking her class on a field trip to the local Aquarium, for example, she will be able to create lessons about the marine animals the children will see. We call this important feature *just in time* learning.

Once the lesson is created, it is played by the student using the Tutor [26, described in Section 4]. Although relatively mellow by video game standards, the tutor engages the student by 1) providing information when needed, 2) operating at the outer edge of the student's competence, 3) rewarding commitment, and 4) challenging the student to think about the relationship among the things being learned. The resulting lessons encompass and instantiate the developments in the pedagogy of how content is learned, remembered and used. The Lesson Creator also allows the coach to program errorless learning, an important feature of effective engagement, particularly for children with motivation and behavioral challenges.

5.1 Errorless Learning

The Lesson Creator adds a significant pedagogical feature to Timo Vocabulary by allowing the coach to give descriptions of the nouns as well as corrective feedback, which allows errorless learning and encourages the student to think as they are learning vocabulary. For example, Timo might ask the student to click on elephant. If the student clicks on elephant, Timo would say "Good, you clicked on elephant. An elephant is an animal with a long trunk" On the other hand, if the student clicked on giraffe instead of elephant, Timo would say, "You clicked on giraffe. A giraffe is an animal with a long neck. An elephant is an animal with a long trunk. Can you click on elephant?" With this type of supportive and corrective feedback, the student learns about both animals, and is encouraged to think about their differences.

5.2 Building Lessons with the Lesson Creator

We know that educational instructors are overworked, and it is a challenge to ask teachers to create new lessons for their students rather than simply using existing content. Teachers should be attracted to this option, however, if it actually saves work and provides a better solution to their goals. The better solution is fairly easy to provide because existing content seldom meets a teacher's exact requirements. A lesson creator will allow her to design and include the material she wishes. To save work, the Lesson Creator will have to be easily learned and easy to use but still include a broad range of options. Our Lesson Creator was developed to provide a highly flexible framework to include a variety of content while simultaneously providing a user-friendly interface to design, create, and pilot test the lesson. In addition, it is easy to implement the options that allow known principles to maximize learning.

Table 1 lists the eight exercises in the tutoring application. Each of these exercises is optional and corresponds to a screen in the Lesson Creator. Each screen allows the coach to specify the

greeting and instructions, the questions, and the feedback, or the coach can simply accept the general default dialog. In addition to these screens, there are three respective screens to import, define, and describe the content. Finally, there is a Salutation screen to specify the introduction to the Lesson and related dialog, which again can be left at the default specifications.

Thus, there are basically three easy steps to create a new lesson using the Lesson Creator. To begin, the coach imports pictures or types the words corresponding to the target concepts. The lesson can consist of a single picture in which the coach selects and defines the target regions, or multiple pictures each with its own definition and description. Having established the targets, their definitions and descriptions are entered into the appropriate text boxes. Finally, the lesson introduction and feedback are entered.

The ease and power of the Lesson Creator is enhanced significantly by the use of Variables. Variables hold values that may change, such as names (Steve/Jennifer/Miguel…) or words (apple, /plum… or quick/slow…). Perhaps one of the most efficient features of the Lesson Creator is that new lessons can be created easily as modifications of existing lessons. If a teacher is composing vocabulary lessons, for example, she can set up the greeting and instructions, the questions, and the feedback for one set of words to give an appropriate framework for the learning. Once this is in place, she can simply insert new vocabulary content into the same framework to make her additional lessons.

The student's progress is tracked and a report of this progress is easily accessed by both the student and the coach.

5.3 Example Lesson

According to the California State Standards for Grade One, students are expected to know that materials can exist in different forms of solid, liquid, and gas. Figure 3 gives a screen shot from a lesson on the *States of Water*, which illustrates that this material can come in water, steam, or ice. Table 2 lists the definition and description of concepts for the lesson on states of water. Providing these illustrations along with definitions and descriptions of these three forms gives the student the knowledge needed to understand their properties and differences.

Table 2. The definition and description of concepts for the lesson on states of water.

Definition:	Description
Steam:	Steam is seen when water is boiled.
Ice	Ice is formed when water is frozen.
Water	Water is a clear liquid with very little taste.

In the Salutation, Timo would give the students an overview about how materials can exist in different forms of solid, liquid, and gas, and indicate that this principle will be illustrated by something that is very familiar to them. Everyone has experienced liquid water, steam, and ice without necessarily thinking about how they are related to one another.

The Pretest and PostTest exercises provide a record of what the student knows before and after learning. The Presentation and Identification exercises teach and test the concepts, respectively, along with guided feedback. The Reading and Spelling exercises reinforce literacy by asking the student to read and spell the

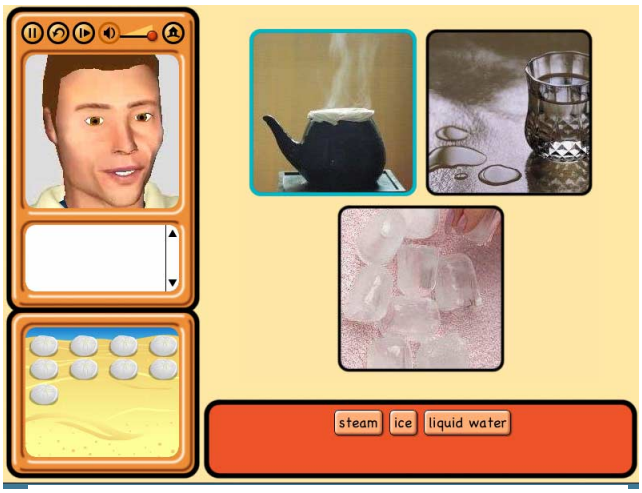

Figure 3. Lesson Screen for the lesson on states of water.

names of the concepts. The Imitation and Elicitation exercises reinforce the appropriate pronunciation by imitating what Timo's pronunciation of the name, or by eliciting the name by highlighting the picture, and asking the child to name it. In both cases, the feedback consists of the child hearing their pronunciation followed by Timo's correct pronunciation. This reinforces the correct pronunciation without requiring automatic speech recognition, which is not accurate enough in this application.

5.4 Evaluation

Analogous to our successful evaluation of the effectiveness of the tutoring platform for vocabulary learning, it is necessary to test the usability of the Lesson Creator. This is much more challenging although we plan several different approaches. First, although user feedback and testimonials have their limitations, they provide an initial source of the application's effectiveness. The reactions from early adopters have been very good (see http://animatedspeech.com/Products/products_lessoncreator.html) . There appear to be two approaches to formal tests. The first would be to use a think-aloud protocol to monitor both novice and experience users while they are composing lessons. The comments during this type of experience have proven successful in illuminating behavior and positive and negative features of interactive applications (4, 6, 8), The second would be to ask teachers to think of a lesson that they would like to implement in an interactive tutoring situation. An expert would then describe how this could be implemented in practice. The follow-up discussion, the actual creation of the lesson, and the teacher's evaluation of this implementation would indicate how adequately the software accomplishes typical educational goals.

6. REFERENCES

[1] Anderson, R. C., & Freebody, P. (1981). Vocabulary knowledge. In J. T. Guthrie (Ed.), *Comprehension and teaching: Research perspectives* (pp. 71-117). Newark, DE: International Reading Association.

[2] Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life: Robust vocabulary instruction*. New York: The Guilford Press.

[3] Bosseler, A. and Massaro, D.W. (2003). Development and Evaluation of a Computer-Animated Tutor for Vocabulary and Language Learning for Children with Autism. *Journal of Autism and Developmental Disorders, 33*, 653-672.

[4] Cooke, N. J. (1994). Varieties of knowledge elicitation techniques. *International Journal of Human-Computer Studies, 41*, 801-849.

[5] Dubois, M., & Vial, I. (2000). Multimedia design: the effects of relating multimodal information. *Journal of Computer Assisted Learning, 16,* 157-165.

[6] Ericsson, A. (2006). Protocol analysis and expert thought: Concurrent verbalizations of thinking during experts' performance on representative tasks. In A. Ericsson, N, Charness, P. J. Feltovich, & R. R. Hoffman (Eds.) *The Cambridge Handbook of Expertise and Expert Performance* (pp. 223-241). Cambridge: Cambridge University Press, 2006.

[7] Gupta, P., & MacWhinney, B. (1997). Vocabulary acquisition and verbal short-term memory: computation and neural bases. *Brain and Language, 59*, 267-333.

[8] Hoffman, R. R., & Lintern, G. (2006). Eliciting and representing the knowledge of experts. In A. Ericsson, N, Charness, P. J. Feltovich, & R. R. Hoffman (Eds.) *The Cambridge Handbook of Expertise and Expert Performance* (pp. 203-222). Cambridge: Cambridge University Press, 2006.

[9] Gee, J.P. (2003). *What video games have to teach us about learning and literacy.* New York: Palgrave/Macmillan.

[10] Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: A variation of the multiple baseline. Journal of *Applied Behavior Analysis, 11*, 189-196.

[11] Lesson Creator. Animated Speech Corporation. http://animatedspeech.com/Products/products_lessoncreator.html

[12] Massaro, D. W. (1987). *Speech perception by ear and eye: A Paradigm for psychological inquiry*. Hillsdale, NJ: Erlbaum.

[13] Massaro, D. W. (1998). *Perceiving talking faces: From speech perception to a behavioral principle*. Cambridge, Massachusetts: MIT Press.

[14] Massaro, D. W. (2003). A computer-animated tutor for spoken and written language learning. . *Proceedings of the 5th international conference on Multimodal interfaces* (pp. 172-175).Vancouver, British Columbia, Canada. November 05 - 07, 2003.

[15] Massaro, D. W. (2004). Symbiotic Value of an Embodied Agent in Language Learning. In R.H. Sprague, Jr.(Ed.), *Proceedings of 37th Annual Hawaii International Conference on System Sciences,(HICCS'04)* (CD-ROM,10 pages). Los Alimitos, CA: IEEE Computer Society Press. Best paper in Emerging Technologies.

[16] Massaro, D.W. (2006). Embodied Agents in Language Learning for Children with Language Challenges. *Proceedings of the 10th International Conference on Computers Helping People with Special Needs, ICCHP 2006* pp.809-816. University of Linz, Austria. Berlin, Germany: Springer.

[17] Massaro, D.W. & Bosseler, A. (2003). Perceiving Speech by Ear and Eye: Multimodal Integration by Children with Autism. *Journal of Developmental and Learning Disorders, 7*, 111-144.

[18] Massaro, D.W., & Light, J. (2004). Improving the vocabulary of children with hearing loss. *Volta Review, 104(3)*, 141-174.

[19] Massaro, D.W., Ouni, S., Cohen, M.M., & Clark, R. (2005). A Multilingual Embodied Conversational Agent. In R.H. Sprague (Ed.), *Proceedings of 38th Annual Hawaii International Conference on System Sciences, (HICCS'05)* (CD-ROM,10 pages). Los Alimitos, CA: IEEE Computer Society Press.

[20] Meyer, D., Princiotta, D., and Lanahan, L., (2004). *The Summer After Kindergarten: Children's Activities and Library Use by Household Socioeconomic Status, National Center for Education Statistics,* Institute of Education Sciences, U.S. Dept. of Education, Education Statistics Quarterly, 6:3.

[21] Nagy, W., & Herman, P. A. (1987). Breadth and depth of vocabulary knowledge: Implications for acquisition and instruction. In M. G. McKeown & M. E. Curtis (Eds.), *The nature of vocabulary acquisition* (pp. 19–36). Hillsdale, NJ: Erlbaum.

[22] National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* Washington, DC: National Institute of Child Health and Human Development.

[23] Prinz, J. J. (2002). *Furnishing the mind: Concepts and their perceptual basis.* Cambridge, Massachusetts: MIT Press.

[24] Qian D.D. (2002). Investigating the Relationship Between Vocabulary Knowledge and Academic Reading Performance: An Assessment Perspective. *Language Learning, 52*, 513-536.

[25] Stahl, S. (1983). Differential word knowledge and reading comprehension. *Journal of Reading Behavior, 15(4)*, 33-50.

[26] Team up with Timo Vocabulary. http://animatedspeech.com/products/products_vocabulary.html

[27] U.S. Department of Education, (2003). *Table AA9, Number of Children Served Under IDEA by Disability and Age Group, 1994 Through 2003,* Office of Special Education Programs, Washington, DC. http://www.ideadata.org/tables2aa94th/ar_.htm .

[28] Vermeer, A. (2001). Breadth and depth of vocabulary in relation to L1/L2 acquisition and frequency of input. *Applied Psycholinguistics, 22*, 217-234.

[29] Vygotsky, L. (1986). *Thought and Language.* Cambridge, Massachusetts: The MIT Press.

[30] Waxman, S. R. (2002). Early word-learning and conceptual development: Everything had a name, and each name gave birth to a new thought. In U. Goswami (Ed.) Blackwell *Handbook of childhood cognitive development* (pp. 102-126). Malden, MA: Blackwell Publishishing.