Language Acquisition through Motor Planning (LAMP) is a therapeutic approach based on neurological and motor learning principles. The goal is to give individuals who are nonverbal or have limited verbal abilities a method of independently and spontaneously expressing themselves in any setting. LAMP imitates neurological processes associated with typical speech development; pairing a consistent motor movement with consistent auditory feedback and a natural response while using a speech generating device. The components of LAMP also include readiness to learn and teaching language in activities with joint engagement. Teaching of vocabulary happens across environments with multisensory input to enhance meaning, with the child's interests and desires determining the vocabulary to be taught. There are no cognitive prerequisites for the implementation of LAMP as intervention can begin at the cause and effect level and systematically build upon the stages of natural language development.

LAMP is listed under AAC treatment approaches on the American Speech and Hearing Association website http://www.asha.org/PRPSpecificTopic.aspx?folderid=8589942773&section=Key_Issues.

LAMP Approach Research

1. Neno, C., Ellawadi, A., Cargill, L., Lyle, S. & David, A. (2016). Vocabulary Development in School-Age Augmentative and Alternative Communication (AAC) Users. Poster presented at the American Speech-Language Hearing Association Annual Conference, Philadelphia, PA.

   Summary: Researchers collaborated to design and study the effects of a fully immersive Language Acquisition through Motor Planning (LAMP)-based classroom. Eight participants were in kindergarten and first grade and spent two hours in a classroom co-taught by three speech-language pathologists and a special educator. The classroom focused on instruction of a set of core vocabulary words instructed across a variety of sensory and scientific/discovery activities. The immersive portion of this classroom took place in large-scale language around a SMARTBoard projecting the Words for Life language program that an adult would model the sequences of the vocabulary being used by the teacher.

   The findings of this study indicated an upward trend in total use and duration of use of the devices, total number of words used and the frequency of different words used. The most significant data trend (compared to control classrooms) is that the greatest language use was shown after the program had ended indicating that this 8-week intensive program "set the stage" for further language growth.

2. Bedwani, M., Bruck, S, Costly, D. (2015). "Augmentative and Alternative Communication for Children with Autism Spectrum Disorder: An Evidence-Based Evaluation of the Language Acquisition through Motor Planning Programme. Cogent Education. 2(1). http://www.tandfonline.com/eprint/gZZtTTfzRYDBqZTsCxWq/full

   Summary: Eight participants received intervention with the LAMP approach and SGD for five weeks. All of the children had received previous intervention prior to the study, (up to 9 years) yet only 25% of them were able to comment at the baseline assessment. At post-program assessment, all subjects showed significant vocabulary increase, all were requesting using a symbolic means of communication (on the device or using spoken language) and 100% of the children were developing social communication through commenting. Other social communication improvements were also observed in gaining attention (75%), expressing feelings (75%) and greetings (87%). All of the children were independently communicating and were not restricted to vocabulary that had been taught to them. Although not the focus of the study, 75% of the children were observed to be using phrases on their device by week 5 of implementation and two of the children in the study were observed at the week 9–10 post-program assessment to be using words with multiple meanings in the right context.

There were a range of other outcomes that parents, teachers and speech pathologists observed and reported including an increase in joint attention, interest, motivation and engagement with others, an overall increase in willingness to communicate and an overall increase in play and social communication. For some of the children, this was the first time they were able to communicate and participate in social situations. Behavior was also reported to have improved with a corresponding decrease in frustration as a result of improved expressive communication.

3. Pulliam, M. H. (2010). "The initial and renewed impact of an AAC device, using the LAMP approach, on an individual with autism spectrum disorder." Master's thesis. Arkansas State University, Jonesboro, Arkansas. http://gradworks.umi.com/14/83/1483250.html

    Summary: Case study of a child who used the LAMP approach, then an alternate approach, and the LAMP approach again several years later. Vocabulary increase was only noted during the periods where the LAMP approach was implemented. The same study was published recently in a peer-reviewed journal but they focused on the AAC device rather than the approach.

    Neeley, R., Pulliam, M. H., Catt, M., McDaniel, D.M. (2015). "The Impact of Interrupted Use of a Speech Generating Device on the Communication Acts of a Child with Autism Spectrum Disorder: A Case Study." *Education*. 9:371-379.

4. Potts, M. and Satterfield, B. (2013). "Studies in AAC and Autism: The Impact of LAMP as a Therapy Intervention." Prentke Romich. Web. 2 Jan. 2015. http://www.gatfl.gatech.edu/tflwiki/images/4/43/LAMP_Rsch_Article.pdf

    Summary: The seven children in this study, who ranged from age three to age seven, had a diagnosis of autism or pervasive developmental disorder-not otherwise specified (PDD-NOS) and complex communication needs (CCN). All seven were diagnosed with expressive-receptive language disorder. Four presented with severe/profound apraxia. Two were found to have dysarthria of speech. Each obtained a speech generating device (SGD) and received LAMP therapeutic intervention. Each child demonstrated communication progress. Language samples from six participants revealed gains as measured by mean length of utterance (MLU) within the first year. Other progress was noted in areas such as enhanced receptive vocabulary, spontaneous use of language, natural vocalization, and in the reduction of difficult behaviors and increase in shared attention.

    Findings Were Presented:

    Satterfield, B. & Halloran, J., (2013, June). Research Insights into LAMP (Language Acquisition through Motor Planning. Institute Designed for Educating All Students (IDEAS) Conference. (St. Simon's Island, GA. June, 2013).

5. Stuart, S. and Ritthaler, C. (2008). "Case Studies of Intermediate Steps/Between AAC Evaluations and Implementation." *Perspectives on Augmentative and Alternative Communication*, 17, 150-155. http://sig12perspectives.pubs.asha.org/article.aspx?articleid=1765951

    Summary: Informal case studies on two children who began using the LAMP approach with a Vantage SGD with a secondary evaluation/therapy center outside of the schools where they received primary services. Both children showed communication improvement while using the LAMP approach. Difficulties with coordinating services with the primary team and modifications that were made to accommodate the primary team are discussed.

Research Specific to Motor Learning and SGDs

1. Dukhovny, E. Effect of Size-Centered vs. Location-Centered Grid Design on Aided AAC Productions. Poster session presented at American Speech and Hearing Association Conference; 2015 Nov 12-14; Denver CO.

Summary: Learning of aided AAC displays frequently begins with several large icons, with icon size decreasing as more vocabulary is introduced ("size-centered design"). Another approach introduces small icons from the start, with icon location maintained as new vocabulary is introduced ("location-centered design"). This on-going study compares the effectiveness of these display designs with neurotypical adults. More subjects are needed but location-centered design is trending toward significance for accuracy and speed of access. Findings support using Vocabulary Builder in a complex communication system over providing limited vocabulary in an orientation that will change as language develops.

2. Dukhovny, E. and Gahl. S. (2014). "Manual motor-plan similarity affects lexical recall on a speech-generating device: implications for AAC users." *Journal of Communication Disorders*, 48, 52-60.

Summary: Neurotypical adults were more successful with recall of motor patterns to access words on SGD when the motor patterns for those words were dissimilar indicating that motor patterns play a role in access speed and recall. "This study provides initial support for the use of motor sequences in SGD-based language production…. If supported with further research findings, evidence of SGD-based motor plans for production will have significant practical clinical implications. Prior research in AAC design has focused primarily on facilitating visual search of the SGD interface by comparing the effectiveness of visual properties of the symbols on the grid, such as iconicity and use of color cues (Thistle & Wilkinson, 2009). Developing motor plan automaticity is a complementary and, in later stages of device use, possibly more efficient, approach to reducing the cognitive load of production (Grabowski, 2010). If SGD-based production quickly becomes automatic, as the current study suggests, one implication is that, with continued SGD use, location of symbols on a grid becomes more relevant to fluent SGD production than the internal visual characteristics of the symbols. Therefore, in planning SGD design and intervention, location of symbols on the AAC device, and the resulting motor plans for accessing symbols, must be taken into account along with visual considerations."

References Supporting LAMP Components

Readiness to Learn

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