Making It A Reality: Using Standards-Based General Education Science and Math Curriculum To Teach Vocabulary and Language Structures to Students who use AAC

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Abstract

Students who use AAC to access vocabulary and language typically receive much of their language intervention in a classroom environment. Given this, it is important to teach emerging vocabulary and language concepts as well as academic content when delivering curriculum to students who use AAC. This article will focus on identifying the language level of the student, providing him or her with a linguistically based AAC system and delivering language intervention within the context of standards-based science and math curriculum. In addition, it will show how a standards-based science and math curriculum can serve as an excellent platform for language instruction. Backwards planning as a method to create authentic and meaningful lessons for students who use AAC will be discussed and demonstrated. The sample lessons will include: a national standard, that standard reframed into an appropriate language target, assessment tools, strategies for teaching and learning and an instructional activity and materials.

When teaching standards-based and standards-driven curriculum to students who use augmentative alternative communication (AAC), the underlying language and communication demands of the content pose a challenge for early language users (Kent-Walsh & Binger, 2009). Looking to typical language development, we know that early language development precedes academic growth. Students enter school at the age of five with extensive vocabularies and complex grammar. For example, typical kindergartners have an expressive vocabulary of approximately 900 to 2000 or more words (Shipley and McAfee, 1998). In addition, they are

producing language structures of Brown's stage five and beyond (Paul, 2001). Conversely, students who use AAC often enter school with limited expressive vocabularies and expressive language delay. Hypothetically, the AAC student may produce only 5 single word approximations, 5 signs, and use 10 picture symbols. The teacher, in collaboration with the speech-language pathologist (SLP), needs to present accessible grade-level curriculum and language intervention to shrink the gap between the student's language level and curricular demands. Given the necessity of language intervention in the classroom, SLPs must incorporate vocabulary and language targets when delivering a standards-based curriculum to students who use AAC. It is typical that language intervention takes place within the context of English Language Arts (Henneberry, Kelso, & Soto, 2012); however, it can and should take place in all academic areas including Math and Science. In this article, backwards planning is discussed as a method to achieve this goal.

Prior to providing language intervention, SLPs need to complete receptive and expressive language assessment, as well as evaluate for an AAC system. It is important to know the student's current receptive and expressive language level, so intervention takes place at the level of impairment - not below or above it. Receptive language assessment reveals understood length of utterance (one, two, three-step commands), approximate size of receptive vocabulary, and ability to comprehend syntax. On the other hand, expressive language assessment helps determine the mean length of utterance of the student, approximate size of expressive vocabulary, type of vocabulary produced, functions of communication, and syntactical production. Students who use AAC often understand more than they can produce. For example, the student may understand three-step commands and simple conversational exchange; however, he or she may only produce single signs and single word approximations yielding a gross MLU-M of one. In addition, the student may have an expressive vocabulary of 20 words (e.g., containing mostly nouns, some verbs and yes/no) and use this vocabulary to reject, request, and ask questions (functions of communication). With this information, individual education plan (IEP) goals are formulated. In this example, initial goals may be to increase single word vocabulary and expand types of words produced. To achieve this goal, a well thought out AAC system and good language instruction is critical.

To expand the language of a student who uses AAC, it is important he/she has access to a linguistically based AAC system (Zangari & Van Tatenhove, 2009). An AAC system can be a manual communication board or a mid-tech to high-tech speech generating device. Linguistically based AAC systems are primarily word-based (vs. phrased-based or sentence-based), include morphological markers (i.e. regular and irregular past tense, present progressive, etc.) and varying parts of speech, serve multiple communicative purposes, and provide access to the alphabet for literacy development (Lloyd, Fuller & Arvidson, 1997; Zangari & Van Tatenhove, 2009). When developing AAC systems, the aim is to organize all aspects of language, not just vocabulary. When students who use AAC have access to a robust language system, they can play with words, word combinations, and grammar. They can form novel messages. If language is represented, it can be explored, modeled, and taught. If it is not a robust system, that exposure and learning cannot occur. For example, if a student says *play* on his or her AAC system, but the play happened yesterday, the SLP can model the past tense

played. However, if regular past tense is omitted from the AAC system, that teachable moment is lost. A stable, well-organized language system allows for expansion of the form, function, and use of language. As form, function and use of language develops, so does the student's ability to communicate effectively and demonstrate knowledge.

Once the language assessment and AAC system development are complete, language instruction within the context of curriculum can begin.   Special educators, classroom teachers, and speech and language pathologists need to work together to incorporate language instruction into the curriculum.   This language instruction is provided through standards and classroom curriculum using backwards planning. As discussed by Henneberry, Kelso and Soto (2012), backwards planning is a process that focuses instruction on the standard or objective. It is an approach to curriculum design that begins with the end in mind, and designs toward that end (Wiggins & McTighe, 2005, 338). Wiggins and McTighe outline 3 stages of their *Understanding by Design* model: (1) identify desired results, (2) determine acceptable evidence, and (3) plan learning experiences and instruction. Given the specific vocabulary and language concept needs of individuals who use AAC, suggest 5 stages of backward planning are suggested by these authors: (1) identify a standard, (2) translate that standard into a learning objective and a language target, (3) plan the assessment, (4) consider strategies for teaching and learning and (5) plan the activity.

The initial stage in backwards planning is to identify the standard. A standard is a written description of what a student should know and be able to do in a subject area. State specific content standards are easily accessed online and closely mirror national content standards. Most empirically proven curriculum is aligned to state or national standards.

The curriculum is the context for teaching the standard and addressing corresponding IEP goals. Curriculum provides motivating and novel material to engage students and promote learning. IEP goals are not curriculum; rather, they are identified areas of deficit to be targeted within the context of the curriculum. Here is an example of a 6th grade California science content standard (California State Board of Education, 2007):
- Students know how to determine the epicenter of an earthquake and know that the effects of an earthquake on any region vary, depending on the size of the earthquake, the distance of the region from the epicenter, the local geology, and the type of construction in the region.

Once the standard is identified, the second stage in backwards planning is to convert it to student-centered language. Converting the standard to student-centered language makes it comprehensible to the student. In addition, the student becomes accountable when it is written in a way he or she can understand. It shifts the focus away from the teacher and gives it back to the student. When converted, the objective may look like this:
- I can find where an earthquake starts.
- I can tell the size of the earthquake.
- I can talk about what happens close to the start of an earthquake, and what happens far away from the start.

- I can talk about what happens to houses and buildings in an earthquake.

Display the objectives so they are easily accessed by students and can be referenced often. Posted objectives keep everyone in the room, including teachers, SLPs and para-educators, focused on the targets. They clearly define the purpose of the lesson. SLPs can introduce the lesson with the posted objective, use it for assessment, and close the lesson by referencing it. Classroom personnel know the objective and students know what they are responsible for learning and can check their understanding.

With the objective(s) clearly defined and posted, look to the student's language level and corresponding IEP goals to determine the language target of the lesson. This will set the expectation for the language to be produced by the student. SLPs play an important role in this part of the lesson planning. As highlighted in Henneberry, Kelso, and Soto (2012), it is important to remember that the role of the SLP is to identify and target underlying skills, not to engage in task assistance. Language intervention remains the focus, not task completion.

Given the objective, *I can tell the size of the earthquake*, the language target for a beginning communicator (who is typically using one word utterances) may be *big* or *move*. For a student who is using 2-3 words, the language target may be *big move*, *big shake* or *no move*. And for a student working on more complex language structures, the target may be the present progressive tense (e.g., *it is shaking*, *it is moving)* or work on comparatives and superlatives (e.g., *big*, *bigger* or *biggest*).

Stage 3 in backward planning is the assessment. The assessment provides meaningful student data that indicates understanding and guides future instruction. In the earthquake example, teacher observation or vocabulary logs may be appropriate.

Consider strategies for teaching and learning in stage 4 of backward planning. This stage incorporates understanding of language acquisition and learning, as well as individual learning differences in students. When developing strategies for teaching and learning, utilize known best practices, such as teaching in context, accessing prior knowledge, breaking the objective down into manageable steps, and targeting the language level and vocabulary needs of each student.

The final stage is to plan the activity and write a lesson that meets the objectives. A sample lesson plan for the earthquake example may be as follows:
1. Prior Knowledge: Access prior knowledge by asking questions about previous science units or other related lessons. Make connections to other books, events, or personal experiences. In addition, reference previous posted learning targets, student work, and visual examples. For example, discuss if students have felt earthquakes or search the U.S. Geological Survey for nearby earthquakes.
2. Objective/Target: Introduce the objective/learning target and post it in the classroom.
3. Direct Instruction: Implement direct instruction using a piece of cloth to represent an area/topography (possibly the same one used in a previous lesson to identify the epicenter)

stretched in front of the students who will experience an earthquake. The earthquake will register a number on the Richter scale (written on the white board). The SLP will model device use, verbalize or sign the magnitude of the earthquake using language targets appropriate for each student.

4. Practice: For additional practice, the topography will experience more earthquakes of different magnitudes. The SLP will scaffold responses for students using prompting strategies (e.g., modeling/hand over hand, visual representation of icon sequences). The SLP will make an association between the numbers on the Richter scale with associated language in the AAC system (e.g., *big*, *bigger*, *biggest*,)
5. Assessment: Students practice and the SLP assesses understanding using observation and vocabulary logs.
6. Closing: The SLP closes the lesson by referencing the posted objective/learning target and affirming specific student successes.

Here is another example of a backwards plan from a California 6th grade standard (California, 2007). This example is from the Math standards.
- Students identify and describe the properties of two-dimensional figures.
- Students identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms.

Converted to student-entered language, the objective may look like this:
- I can talk about different types of shapes.
- I can talk about different types of angles.
- I can talk about the difference between shapes and angles.

Language targets for a beginning communicator using single words may include, *square*, *next to*, or *open*. For a student using 2-3 words, a language target may be *4 side*, *together at corner*, or *it open*. For a student using more complex language structures, the target may be +s or use of pronouns and/or prepositions. For example, it has *4 sides* (rectangle/square/parallelogram), *they come together at the corner* (adjacent angles), *they come together in the middle* (vertical angles), *it is open* or *it is closed* (angle vs. shape).

The assessment for this lesson may be SLP observation and a short test of knowledge given during independent practice. Strategies for teaching and learning in this example may include accessing necessary prior math and language knowledge, making that information visually available for the students, and access to manipulatives or other visual examples during direct instruction.

A sample lesson plan for this activity may be:
1. Prior Knowledge: Access prior knowledge by referencing previous posted learning targets, student work, and visual examples. For example, go on a scavenger hunt, locating and collecting different shapes and angles around the classroom.
2. Objective/Target: Introduce the objective/learning target and post it in the classroom
3. Direct instruction: Use manipulatives and whiteboard to represent concepts in various ways

as the teacher models vocabulary and language structures on the AAC system.

4. Practice: With appropriate scaffolding, the SLP and student go through various examples together with manipulatives, on the white board, and on AAC system.
5. Assessment: Students have the opportunity for independent practice. The SLP observes and provides further scaffolding, if necessary.
6. Closing: The SLP closes the lesson by referencing the posted objective/learning target and affirming specific student successes.

The SLP's role is to make standards and standard driven curriculum accessible to students who use AAC systems. The science and math standards highlighted in the examples above become accessible via backwards planning. Even complicated standards can be broken down to their fundamental elements and made accessible to all.

SLPs are mandated by law to teach state adopted standards through a systematic curriculum. The curriculum, simply put, is the context for teaching standards. Because students who use AAC typically enter school with limited vocabulary and language structures, accessing the curriculum is often difficult. In order to bridge the gap between language and curriculum, language and AAC assessment, goal formulation, and intervention must occur. It is known that language is learned in context. Backwards planning from standards provides a model for teaching vocabulary and language structures in the context of curriculum. All students can access and benefit from a standards-based and standards-driven education.

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