CHAPTER 25

Games and Comprehension

The Importance of Specialist Language

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Words are of course, the most powerful drug used by mankind.
—RUDYARD KIPLING

The argument in this chapter is as follows: Success in school requires children to comprehend the complex academic language found in the content areas in school (e.g., science, math, social studies). This, in turn, requires a good school-based vocabulary and familiarity with the syntactic and discourse features of such language. It is best to get ready for these language demands early in life, at home, before coming to school and to sustain home-based support for such academic language development thereafter. It is difficult to develop a good school-based vocabulary starting late, without such early and ongoing home-based support (Gee, 2004). To remedy such a vocabulary problem requires lots of reading—which people with a poor vocabulary are often not motivated to do—but, unfortunately, lots of reading, while important, is neither highly efficient nor totally effective, by itself, as a way to learn vocabulary (Gersten, Fuchs, Williams, & Baker, 2001).

So what can we do? Decades of research show that we need to teach comprehension strategies overtly in school from the early grades (Pressley, 2006). We need, as well, to teach as much vocabulary as we can with the most effective methods (Pearson, Hiebert, & Kamil, 2007). Both of these matters are covered elsewhere in this book. Here I suggest an unorthodox third possible source of help: to learn from and even use popular culture practices for literacy development. I concentrate here on video games and games that have both face-to-face and video forms (Gee, 2007, 2013; Hawisher & Selfe, 2007). Similar arguments could and have been made using other popular culture practices (e.g., fan fiction writing; see Black, 2005, 2007).

Types of Words

We can divide vocabulary into three types of words (Beck, McKeown, & Kucan, 2002). First, there are "everyday," "vernacular," or "informal words" such as *hot, nice, happy*, and so forth. Everyone knows such words as part of the process of becoming a native speaker. Second, there are "technical words" such as *generative* in mathematics or linguistics, *mitochondria* in biology, *quark* in physics, or *power up* in video gaming. Such words are best learned as part of the process of learning the domains in which they are technical terms. Third, there are what I call "formal words" such as *perceive, assertion, insinuate, advocate, simultaneous*, and so forth. Such words are found in a variety of different specialist areas or public sphere activities (e.g., philosophy or social activism), in literature, in the content areas of school, and in the more formal vernacular of some speakers (i.e., those heavily influenced by school-based sorts of books).

Formal words have a wider application than technical terms, though they sometimes have more technical uses within a given specialist area (e.g., *sensitivity* in physiological psychology or *assertion* in linguistics—in fact, even informal words can have a technical meaning in some domain, for example, *work* in physics). "Formal words" are the ones most important to teach in school as part of "language arts" and the content areas to increase student comprehension.

Formal words—like all words—take on somewhat different meanings in different contexts (Gee, 2004, 2014). In particular, they may mean somewhat different things in different sorts of situations, activities, texts, or academic or specialist areas of concern (e.g., consider the different meanings words like *process, system*, and *formal* might take on in different contexts of use). Thus, it is not effective to teach these words out of context and leave things at that. Children need in-school and out-of-school experiences to see and hear these words in a variety of different contexts.

Many children see and hear formal words in various texts and content areas in school far more than they hear them in everyday forms of talk at home or in their communities (though children from highly educated homes hear a good number of them in talk). I suggest below, however, that many children, rich and poor, see and hear a good number of both technical terms and formal words in some of their popular culture practices.

Specifically, in the chapter I do the following:

- Define specialist language and its impact on students' comprehension.
- Report early oral vocabulary correlates with school success.
- Identify informal specialist language lessons that could occur at school and at home.
- Describe the implications of specialist language comprehension research and instruction today in the future home.

What We Know Now: Specialist Language

I refer in this chapter to forms or styles of language that use lots of technical terms or formal words, or both (and recruit characteristic forms of complex syntactic and discourse structures) as *specialist language*. Academic content areas (e.g., biology or literary criticism) use specialist forms of language. School content areas (e.g., social studies, math, language arts, or science) use specialist forms of language. Some types of literature—the types we tend to use in school—use a good many formal words, as well as complex

syntactic and discourse patterns, so I call this specialist language as well. Some popular culture practices also use lots of technical words and formal words, as well as complex syntactic and discourse patterns, so these, too, are specialist forms of language. Remember, though, that there are people who, in some contexts, use lots of formal words in their everyday vernacular when they are not talking as specialists of any sort, but these people have picked up this vocabulary because of their exposure to the sorts of specialist texts and talk often found in school and books.

New Research: Early Oral Vocabulary Correlates with School Success

Phonemic awareness and early practice with literacy are the most important factors before school that predict a child's success in first grade (Dickinson & Neuman, 2006). However, the most important factors that predict a child's success past the first grade, essentially for the rest of schooling, are the child's early home-based oral vocabulary and early skills with complex oral language (Dickinson & Neuman, 2006; Senechal, Ouellette, & Rodney, 2006).

There is an important qualification that needs to be made here. Decades of research in linguistics have shown that every normal child develops a perfectly adequate oral language, the child's "native language" (Chomksy, 1986; Pinker, 1994)—and, of course, sometimes children develop more than one native language. When I say that children's early vocabulary and skills with complex language are crucial correlates of success in school, I am not talking about children's everyday ("vernacular") language. I am talking about their early preparation for language that is "school-based," "specialist," or "academic" (Gee, 2004; Schleppegrell, 2004). I am talking about the difference between saying something like "Hornworms sure vary a lot in how well they grow" (vernacular) versus "Hornworm growth displays a significant amount of variation" (specialist).

Informal Specialist Language Lessons at Home

Let me give an example of what I am talking about in terms of getting ready early in life for the demands school will eventually make for specialist language. Kevin Crowley has talked insightfully about quite young children developing what he calls "islands of expertise" (Crowley & Jacobs, 2002). Crowley and Jacobs (p. 333) define an island of expertise as "any topic in which children happen to become interested and in which they develop relatively deep and rich knowledge." In this respect, then, consider a mother talking to her 4-year-old son, who has an island of expertise around dinosaurs (the transcript below is adapted from pages 343–344). The mother and child are looking at a replica fossil dinosaur and a replica fossil dinosaur egg. The mother has a little card in front of the boy that says:

- Replica of a Dinosaur **Egg**
- From the Oviraptor
- Cretaceous Period
- Approximately 65 to 135 million years ago
- The actual fossil, of which this is a replica, was found in the Gobi desert of Mongolia

The child says, "This looks like this is a egg," and the mother responds, "That's exactly what it is! How did you know?" The child says, "Because it looks like it," and the mother responds, "That's what it says [on the card], see look **egg egg . . .** replica

of a dinosaur **egg**. From the oviraptor." Here the mother asks the child the basis of his knowledge ("How did you know?"). Then she publicly displays reading of the technical text, even though the child cannot yet read. This reading uses print to confirm the child's claim to know, showing one way this type of print (descriptive information) can be used in an epistemic game of confirmation, and demonstrates the primacy of print as evidence. Specialist domains are almost always "expert" domains that involve claims to know and evidence for such claims, evidence that is very often tied to print.

Here and elsewhere in the interaction, the mother also uses elements of nonvernacular, specialist language. For example, here, "**replica** of a dinosaur egg"; "from the **oviraptor**"; and later, "from the **Cretaceous period**"; "the **hind claw**"; "their **prey.**"

In the interaction as it proceeds, the mother makes a number of other moves that facilitate the early development of specialist language. For instance, the mother relates the current talk and text to other texts with which the child is familiar when she says at one point, "You have an oviraptor on your game! You know the egg game on your computer?" and, at another point, "And remember they have those, remember in your book, it said something about the claws." This sort of intertextuality helps the child to connect words, the world, images, technologies, and written texts.

The mother explicates hard concepts by saying things like "And that's from the Cretaceous period. And that was a really, really, long time ago." This signals to the child that *Cretaceous period* is a technical term, and displays how to explicate such terms in the vernacular. She also offers technical-like definitions when she says things like "And this is . . . the hind claw. What's a hind claw? [pause]. A claw from the back leg from a velociraptor." This demonstrates a common language move in specialist domains, that is, giving relatively formal and explicit definitions (not just examples of use).

This interaction is a language lesson, but not primarily a lesson on vernacular language, though, of course, it thoroughly mixes vernacular and specialist language. It is a lesson on specialist language. It is early preparation for the sorts of school-based language children see ever more increasingly in talk and in texts as they move on in school.

All this, however, raises the issue of what happens to children who come to school without such informal specialist language teaching, and, often, too, without other important aspects of emergent literacy. My view is that this issue cannot be ignored. We cannot just move on to reading instruction of the "decode and literally comprehend" sort as if it just doesn't matter that these children have missed out on early specialist language learning. For these children, language teaching for "academic language" (one form of specialist language) needs to start with and sustain itself throughout the course of reading instruction (Zwiers, 2007).

How This New Knowledge Can Improve Comprehension Instruction: If Your Vocabulary Is Poor, It Is Not Easy to Get a Better One

When children end up with poor vocabularies late in their schooling, it is a very hard problem to remedy. In fact, vocabulary learning involves a paradox: If you have a poor vocabulary, the only way to remedy the matter is to engage in lots of independent reading (something people with poor vocabularies often don't want to do). However, reading is really not an effective way to learn vocabulary:

> The variety of contexts in which words can appropriately be used is so extensive, and the crucial nuances in meaning so constrained by context, that teaching word meanings in an abstract and decontextualized manner is essentially futile and potentially misleading. . . .

> The only realistic chance students with poor vocabularies have to catch up to their peers with rich vocabularies requires that they engage in extraordinary amounts of independent reading. (Baker, Simmons, & Kame'enui, n.d.; see also Anderson & Nagy, 1991).
>
> It may be somewhat surprising to learn that most researchers agree that although students do learn word meanings in the course of reading connected text, the process seems to be fairly inefficient and not especially effective (Beck & McKeown, 1991). Beck and McKeown state that "research spanning several decades has failed to uncover strong evidence that word meanings are routinely acquired from context. (Gersten et al., 2001, p. 284)

So we face an interesting problem: How to get children to learn academic or specialist vocabulary when they may not want to engage in lots of reading and when that reading will not necessarily be highly effective in solving the problem. As I pointed out in the introduction, research has shown that we need to teach and practice comprehension strategies overtly in school from the early grades on (Pressley, 2006). We need, as well, to teach and practice as much vocabulary as we can with the most effective methods (Pearson et al., 2007). In addition, I want to suggest an unorthodox supplement to these approaches: to learn from and even use popular culture practices for literacy development.

Specialist Language in Popular Culture

Something very interesting has happened in children's popular culture. It has gotten very complex and it contains a great many activities that involve highly specialist styles of language (Gee, 2007, 2004, 2013). For example, consider the text below, which appears on a *Yu-Gi-Oh* card. *Yu-Gi-Oh* is a card game involving quite complex rules. It is often played face-to-face with two players, sometimes in formal competitions, more often informally, though it can be played as a video game as well.

> **Armed Ninja**
> **Card-Type:** Effect Monster
> **Attribute:** Earth | **Level:** 1
> **Type:** Warrior
> **ATK:** 300 | **DEF:** 300
> **Description:** FLIP: Destroys 1 Magic Card on the field. If this card's target is face-down, flip it face-up. If the card is a Magic Card, it is destroyed. If not, it is returned to its face-down position. The flipped card is not activated.
> **Rarity:** Rare

The "description" is really a rule. It states what moves in the game the card allows. While this text has little specialist vocabulary (though it has some; e.g., *activated*), it contains complex specialist syntax. It contains, for instance, three straight conditional clauses (the "if" clauses). Note how complex this meaning is: First, if the target is face-down, flip it over. Now check to see whether it is a magic card. If it is, destroy it. If it isn't, return it to its face-down position. Finally, you are told that even though you flipped over your opponent's card, which in some circumstances would activate its powers, in this case, the card's powers are not activated. This is "logic talk," a matter, really, of multiple related "either–or", "if–then" propositions. It is the type of explicit specialist language children will see often in school in the later grades.

Consider another *Yu-Gi-Oh* card:

Cyber Raider
Card-Type: Effect Monster
Attribute: Dark | **Level:** 4
Type: Machine
ATK: 1400 | **DEF:** 1000
Description: When this card is Normal Summoned, Flip Summoned, or Special Summoned successfully, select and activate 1 of the following effects: Select 1 equipped Equip Spell Card and destroy it. Select 1 equipped Equip Spell Card and equip it to this card.
Rarity: Common

This card has the following technical words (some are compound words) on it: *effect monster, dark, machine type, normal summoned, flip summoned, special summoned, successfully, select, activate, effects, equipped, Equip Spell Card, destroy, rarity*, and *common*. These all have special meanings within the game rules. You don't really know exactly what they mean unless you know the game. These words, for the most part, what I called "formal words" earlier, are here being used as technical terms in the game. While they have specialized uses within the game, their uses there are related to their more common meanings in other activities and areas.

I have watched 7-year-old children play *Yu-Gi-Oh* with great expertise. They must read each of the cards. They endlessly debate the powers of each card by constant contrast and comparison with other cards when they are trading them. They discuss and argue over the rules and, in doing so, use lots of specialist vocabulary, syntactic structures, and discourse features. They can go to websites to learn more or to settle their disputes. If and when they do so, here is the sort of thing they will see: "The effect of '8-Claws Scorpion' is a Trigger Effect that is applied if the condition is correct on activation"—note *effect, applied, condition, activation*, and the conditional "if" clause.

Lucidly Functional Language

Let's consider for a moment what *Yu-Gi-Oh* involves. First and foremost, it involves what I call "lucidly functional language." The language on *Yu-Gi-Oh* cards, websites, and in children's discussions and debates is quite complex, but it relates piece by piece to the rules of the game, to the specific moves or actions one takes in the game. Here language—complex specialist language—is married closely to specific and connected actions. The relationship between language and meaning (where meaning here is the rules and the actions connected to them) is clear and lucid.

Situated Meaning and Verbal Meanings

There are two ways to understand words. I call one way "verbal" and the other way "situated" (Gee, 2004, 2014). People have situated understandings of words when they can associate them with images, experiences, actions, or dialogue with which the words are associated. They have merely verbal understandings when they can only associate the words with other words (e.g., a paraphrase or a definition). While verbal understandings may facilitate passing certain sorts of information-focused tests, they do not necessarily facilitate actual problem solving in which learners have to apply words to the world to accomplish goals and actions.

Situated understandings are, of course, the norm in everyday life and in vernacular language. Even the most mundane words take on different meanings in different contexts

of use, and we can associate the words with different images and actions in the different contexts. For instance, people construct different meanings for a word like *coffee* when they hear something like "The coffee spilled; get the mop" versus "The coffee spilled; get a broom" versus "The coffee spilled, stack it again."

Situated Meanings and Video Games

We can see the nature and importance of situated meanings if we consider video games for a moment (Gee, 2007, 2013). Written texts associated with a video game are not very meaningful, certainly not very lucid, unless and until one has played the game. Let me take the small booklet that comes with the innovative game *Deus Ex* as an example. In the 20 pages of this booklet, there are 199 boldface references that represent headings and subheadings; one small, randomly chosen stretch of headings and subheadings that appears at the end of page 5 and the beginning of page 6 includes the following headings: **Passive Readouts**, **Damage Monitor**, **Active Augmentation & Device Icons**, **Items-at-Hand**, **Information Screens**, **Note**, **Inventory**, **Inventory Management**, **Stacks**, **Nanokey ring**, **Ammunition**. Each of these 199 headings and subheadings is followed by text that gives information relevant to the topic and relates it to other information throughout the booklet. So, though the booklet is small, it is just packed with concise technical information. Here is a typical piece of language from this booklet (Ion Storm, 2000):

> Your internal nano-processors keep a very detailed record of your condition, equipment, and recent history. You can access this data at any time during play by hitting F1 to get to the Inventory screen or F2 to get to the Goals/Notes screen. Once you have accessed your information screens, you can move between the screens by clicking on the tabs at the top of the screen. You can map other information screens to hotkeys using Settings, Keyboard/Mouse. (p. 5)

This makes perfect sense at a literal level, but this just goes to show how worthless the literal level is. When you comprehend this sort of passage at only a literal level, you have only an illusion of understanding, one that quickly disappears as you try to relate the information in this passage to the hundreds of other important details in the booklet. This passage means nothing real to you if you have no situated idea about what *nano-processors, condition, equipment, history, F1, Inventory screen, F2, Goals/Notes screen* (and, of course, *Goals* and *Notes*), *information screens, clicking, tabs, map, hotkeys*, and *Settings, Keyboard/Mouse* mean in and for playing games like *Deus Ex*.

Second, though you know literally what each sentence means, the sentences raise a plethora of questions if you have no situated understandings. For instance: Are the same data (condition, equipment, and history) on both the Inventory screen and the Goals/Notes screen? If so, why are the data on two different screens? If not, which type of information is on which screen and why? The fact that I can move between the screens by clicking on the tabs (but what do these tabs look like, will I recognize them?) suggests that some of this information is on one screen and some is on the other. But, then, is my "condition" part of my Inventory or my Goals/Notes—doesn't seem to be either, but, then, what is my "condition" anyway? If I can map other information screens (and what are these?) to hotkeys using "Setting, Keyboard/Mouse," does this mean there is no other way to access them? How will I access them in the first place to assign them to my own chosen hotkeys? Can I click between them and the Inventory screen and the Goals/Notes screens by pressing on "tabs"?

Of course, all these terms and questions can be defined and answered if you closely check and cross-check information over and over again through the little booklet. You can constantly turn the pages backward and forward. But once you have one set of links relating various items and actions in mind, another drops out just as you need it and you're back to turning pages. Is the booklet poorly written? Not at all. It is written just like, in fact, any of myriad school-based texts in the content areas.

When I first read this booklet before playing *Deus Ex*, I was sorely tempted to put the game on a shelf and forget about it. I was simply overwhelmed with details, questions, and confusion. So I decided just to play the game—however badly—for several hours. After playing, when I went back to the booklet, something marvelous had happened. Now all the language in the booklet was lucidly clear and easy to understand. Why? Because now I had an image, action, experience, or piece of dialogue from the game to associate with words—had situated meanings for the words. Then, at last, the booklet made good sense.

Content at School: Situated Meanings through Playing the "Game"

So now I would make the same claim about any school content domain I just made about the video game *Deus Ex*: Specialist language in any school domain (e.g., math, science, or social studies) has no situated meaning (thus, it has no lucid or applicable meaning) *unless and until* one has "played the game", that is, engaged in and with the images, actions, goals, experiences, practices, and dialogue that give situated meaning to words in these domains.

Good video games support not only situated meanings for the written materials associated with them in manuals and on fan websites—and these are copious—but also for all language within the game itself (Gee, 2007, 2013). The meaning of such language is always associated with actions, goals, experiences, images, and dialogue. Furthermore, always and only, players get verbal information (words) "just in time," when they can apply it or see it apply, or "on demand," when they feel the need for it and are ready for it (and then, in some cases, games give the player walls of print; e.g., as in the whole series of *Civilization* games).

So my claim is this: What I call "game-like learning" leads to situated meanings, not just verbal ones. In turn, situated meanings make specialist language lucid, easy, and useful.

Implications

Make Meaning Lucidly Functional

My point is not just to use popular culture for literacy learning, but to learn from popular culture how to teach traditional content better. Whenever we can, we should seek to make the meanings of specialist language in school lucidly functional, much in the way the language is in *Yu-Gi-Oh*.

For example, the science educator Andrea diSessa (2000) has successfully taught children in sixth grade and beyond the algebra behind Galileo's principles of motion by teaching them a specific computer programming language called *Boxer*. Using Boxer, students write into the computer a set of discrete steps in the programming language. For example, the first command in a little program meant to represent uniform motion might tell the computer to set the speed of a moving object at 1 meter per second. The

second step might tell the computer to move the object. And a third step might tell the computer to repeat the second step over and over again. Once the program starts running, the student will see a graphical object repeatedly move 1 meter each second, a form of uniform motion. Now the student can elaborate, play with, and change the model in various ways, for example, by adding a fourth step that tells the computer to add a value *a* to the speed of the moving object after each movement the object has taken (let us just say, for convenience, that *a* adds 1 meter more per second at each step), a step that models the concept of acceleration.

Here students are creating and observing quite direct links between actions they take in the programming language, the meanings of technical words (e.g., *uniform motion, acceleration*), and images they see on the screen. This is one powerful form of situated meaning.

Implications Continued

Situate Meanings

Beyond creating lucid functionality, there are, of course, other ways to situate meanings in order to enhance comprehension. Specialist language should be associated with images, actions, experiences, goals, and dialogue, not just verbal explications, summaries, definitions, and texts. Verbal information should be given "just in time"—near the time when learners will use it—or "on demand"—when learners are ready for it and know they need it and why they need it.

For example, the learning scientist David Shaffer (2007) runs workshops for middle school children where they are given an urban planning challenge: Working as teams, the children are asked to create, then report on a detailed redesign plan for a major pedestrian thoroughfare in their own town. Like real professional urban planners, the students' plans must meet the social, economic, and physical needs of their communities. Students talk to real urban planners; they study their communities and read about urban planning, but they also have simulation software (using a GPS [global positioning system] device) that lets them see a virtual representation of the street they are going to replan.

The simulation has two components: a decision space and a constraint table. The decision space displays address and zoning information using official two- or three-letter zoning codes to designate changes in land use for property parcels on the street. As students made decisions about changes they wished to make, they received immediate feedback about the consequences of changes in the constraint table, which shows the effects of changes on six planning issues raised in the original information packet and the video: crime, revenue, jobs, waste, car trips, and housing.

Here, lots and lots of language that is common in the social sciences is placed in a context of image, action, experiences, goals, and dialogue, not just texts. Meaning is fully situated. Shaffer's work has demonstrated that such an approach leads to large language and thinking gains.

Using Popular Culture in Classrooms

While I want to advocate using popular culture for language, comprehension, and literacy development, I do not advocate turning it into a school subject used for grading and sorting. This is just a way to co-opt what the children own and take a feeling of ownership away from them. Rather, I advocate finding children's areas of expertise in

popular culture and helping them to use these areas to build, practice, and identify with specialist vocabulary and language skills (Shaffer, 2007). This can be done in a number of the following ways:

1. Have children teach and explicate their areas of expertise to parents, teachers, and other children.
2. Engage children with research projects that involve their areas of expertise and encourage extended talk, discussion, argumentation, and writing in various genres.
3. Have children explicate vocabulary in their areas of expertise and encourage them to relate these words to other uses these words have in other areas and activities.
4. Have children read and write challenging texts from their areas of expertise for real purposes that do not just recruit these areas for "doing school" (engage with reading and writing on chats, boards, forums, reviews, and websites—have children talk and write about such engagement to parents, and at school to teachers and to other children as well).
5. Encourage children to develop a new area of expertise (perhaps one related to an old area of expertise), all the while helping them to pay overt attention to words and language in this area.
6. Encourage children to engage in discussions and to make arguments about their areas of expertise with other children who share their expertise. Encourage extended and explicit talk and writing that is responsive to other people's questions and concerns.
7. Encourage children to read what others—including adults—have said about their areas of expertise and how these areas relate to larger social and cultural issues.

Summary

The most important thing we can do for children in the area of popular culture is to encourage them to develop areas of expertise that recruit specialist language and thinking, then get them to think, talk, and write at a "meta" level about this area to their peers, parents, and teachers. We need to encourage them, as well, to think about the relationships that exist between their area of expertise and other related and unrelated areas and activities in the world. Our ultimate goal for literacy comprehension instruction and research is to understand better how we can get students to think about how language works in their local worlds and in the larger global world.

INTEGRATE, INVESTIGATE, AND INITIATE: QUESTIONS FOR DISCUSSION

1. Give yourself a grade as to how knowledgeable you were prior to reading this chapter about the importance of specialist language in teaching comprehension for this new generation of students. Grade yourself as to how knowledgeable you feel you are now that you have read this chapter.

2. Create an informal, specialized language lesson at your school or school district that could increase children's comprehension.

3. Project what effect technology and games will have upon future students' comprehension and give your reasons why.

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