Chapter 4

Cognition, Culture, Language, and Assessment

How to Select Culturally Valid Assessments in the Classroom

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Chapter Overview

In order to be effective across the broad range of students in U.S. classrooms today, teachers must know how to accurately and equitably assess learning. To do so, they need to be aware of the role that cognition, language, and culture play in children’s perception and understanding of the world and how they can use that knowledge to ensure culturally valid assessment practices in their classrooms. This chapter is divided into two main sections. The first section provides an overview of key research findings on the overall impact of culture and language on cognition and assessment. The second section discusses ways to promote equitable assessment in the classroom, taking into consideration the impact of students’ cultural and linguistic backgrounds.

For the sake of simplicity, the terms “test item” and “assessment task” are used interchangeably.

The Relationship Between Culture and Cognition

There is little doubt that, throughout the world, all children follow the same general pattern of cognitive development. However, it is important to acknowledge the cross-cultural variability among and within each culture. Most of the cultures research on child development has focused on Western patterns of human thought and only in children from certain socio-economic and cultural backgrounds. For example, in the U.S., most of the research is based on a standard population of children who are white, middle class, and urban. As Patricia Greenfield (2000) indicates, there is a need for a developmental framework that provides insight into the relationship between social and cognitive development and addresses cross-cultural variability.

According to Resnick (1991), every cognitive act must be viewed as a specific response to specific social and physical circumstances. In order to understand children’s development, we need to be aware of the context in which children construct and acquire knowledge. Children grow and develop in specific cultural settings. Different ways of understanding and relating to objects and people influence the development of their cognition. Castagno and McKinley (2008)
emphasize that “one’s epistemology is fundamental to how he or she sees the world, understands knowledge, and lives and negotiates everyday experiences” (p. 952). A key question that needs to be addressed is, to what degree does culture influence cognition? What follows is a brief summary of research that highlights recent findings in selected areas.

The following example in the area of categorization illustrates how cross-cultural differences impact the way this concept is acquired and represented. Adopting a cross-linguistic, cross-cultural developmental perspective, Waxman, Medin, and Ross (2007) focused on the relationship between core knowledge, naming, and acquisition of the concept “alive,” or “living things.” Their research questions were: (1) What are the capacities young children bring to the tasks of acquisition of the concept? (2) How does the environment shape the process of acquisition? The concept of living things includes members of both plant and animal kingdoms. Developmental research reveals that this concept is difficult to master (Angorro, Waxman, & Medin, 2005; Hatano & Siegler, 1993; Piaget, 1954). Piaget observes that young children tend to believe that inanimate objects are alive because they appear to move on their own.

In order to understand how children from different cultural and language backgrounds address this concept, Waxman et al. (2007) gave two tasks to children of ages 4 to 10 from Indonesia, Mexico (Mayan), and the United States. In the first task, they showed them a picture of a person and asked them: “Could you call this an animal?” As in a previous study (Angorro et al., 2005), Indonesian and Tzotzil-speaking Mayan children responded categorically in the negative, suggesting that for them, people and animals are mutually exclusive categories. In contrast, 50% of English-speaking children responded in the positive, indicating that human beings are also animals, and 50% responded in the negative. On a separate task, children were asked to sort 17 cards, each depicting a living or non-living entity. Children were asked to sort the cards in different ways. Specifically, they were asked to sort on the basis of whether the entities: (1) were alive, (2) could die, or (3) could grow. The three possible sorting anticipated were: only animals, living things including animals and plants, and natural kinds (animals, plants, and other natural things that were not artifacts).

Important commonalities were found in the categorization, naming, and reasoning tasks of the three different communities of children. Regardless of their cultural background, all children were able to sort cards by LIVING THINGS, placing humans, animals, and plants in the same category. However, when they sorted on the basis of the predicate ALIVE, striking differences were found. While English and Indonesian children had similar patterns of development, with minor differences in reference as to how they used the term ALIVE to sort, Mayan children endorsed a broader interpretation of ALIVE to include natural phenomena such as the sun, clouds, and water. These natural kinds are considered inanimate in the English speaking and Indonesian communities. The sorting results illustrate the intimate connection between culture and conceptual organization in the developmental patterns. In the Mayan culture, it is not uncommon to give these entities (sun, clouds, etc.) a living power. Very likely, the developmental differences reflect the naming practices and the belief systems in each representative community.
Research has shown evidence of both similarities and differences in patterns of cognitive organization. For example, Saalbach and Imai (2007) conducted a study to determine whether Westerners organize object concepts around taxonomic relations, while Easterners organize them around thematic relations, as Nisbett (2003) has suggested. Saalbach and Imai tested the relative importance of three types of relations—taxonomic, thematic, and classifier—for Chinese and German speakers using a range of tasks, including categorization, similarity judgment, property inductions, and fast-speed word–picture matching. No significant differences were observed in the ways in which Chinese and German speakers organize everyday object concepts. However, minor differences were observed related to linguistic and cultural factors. For example, they found that Chinese preschoolers used shape similarity as a basis for non-verbal categorization at a higher rate than German preschoolers.

Greenfield (2000) indicates that we need to look very closely at the specific ways that children develop their cognitive abilities in different cultures. Also, she stresses the need for ensuring that the methods used to assess performance on cognitive tasks are in accord with the characteristics of the children’s cultures. These issues are clearly highlighted in research conducted by Cole (1996, 2006), who argues that the common belief that all children reach a certain level of cognitive development at roughly equal ages across cultures is not necessarily true. When standardized Piagetian conservation tasks are given to children in different societies, widely varying results are obtained. This finding has led to two different, but not necessarily exclusionary, hypotheses. First, it is likely that some cultures promote more cognitive development than others; second, without certain kinds of cultural experiences (for example, formal schooling), more abstract ways of thinking, such as that involved in conservation, might not be attainable (Cole, 2006). However, the same research also implicates cultural differences in the interpretation of the children’s performance on the tasks, not necessarily in logical development.

Two examples illustrate how performance on the same task is shaped by cultural factors. The first example involves the standard conservation procedure, as developed in Geneva, in which the participant is presented with two beakers of equal circumference and height filled with equal amounts of water. The water from one beaker is then poured into another taller beaker with a smaller circumference, and then the person is asked which of the two beakers contains more water. In the study described by Cole (1996), children and young adults from non-literate societies of a given age were significantly more likely than children from other societies to decide that the taller, thinner beaker contained more water. However, an experiment on the effects of modifying testing procedures to match local cultural knowledge revealed a different pattern of results. In the revised procedure, the participants were asked to solve the conservation task and then to explain their answers to the experimenter according to language usage in their communities. While these participants continued to wrongly indicate that the narrower beaker had “more” water, when asked to provide an explanation, they explained that although the level of the water was “more,” the quantity was the same (Cole, 2006). In other words, the participants were aware that the
quantity was the same, which is the correct answer. However, the format and the language of the testing procedure did not allow them to give their answers in a way in which they would be properly interpreted.

The second example involves procedures developed in Cambridge, Massachusetts, as an extension of Piaget's work in Geneva. Greenfield (1997) administered conservation of quantity tasks to un schooled Wolof children in Senegal. The children were instructed to transfer water from a short beaker to a long, thin one; and then, according to the Cambridge interview protocol, they were asked whether the quantity of water in the thin beaker was the same, more, or less in their native language. Questions such as: "Why do you think it is the same (or more, or less) amount of water?" or "Why do you say it is the same (or more, or less) amount of water?" were not responded to by the children. They were only able to respond when the question was changed to: "Why is the water the same (or more, or less)?" Greenfield explained that the reason the children did not answer the protocol questions was that the Wolof culture has an epistemology of mental realism. The children were not making a distinction between the nature of reality and their knowledge of it. Providing explanations of why they thought something happened was not relevant for them. It was the actual action that took place that was meaningful to them, not what they thought about it.

If the protocol had not been changed to further explore the children's lack of response, a wrong assumption about their knowledge would have prevailed. As Solano-Flores and Nelson-Barber (2001) indicate, because culture and society shape mental functioning in many ways, individuals have predisposed notions of how to respond to questions and solve problems. Therefore, it is important to design and use assessments that take in consideration the socio-cultural context of the people being assessed.

The Relationship Between Language and Cognition

Language development in children is characterized by astonishing complexity and speed. By two years of age, children have learned many words and can put them together to form simple sentences. By age four, children have mastered a large portion of the grammatical components of their native language. There is, of course, variation in children's language development by the age they enter school; and many of the more complex syntactic forms as well as high-level vocabulary and phonological skills associated with reading and writing are yet to be learned over a period of years (Bowey & Tunmer, 1984; Flood & Menyuk, 1983; Owens, 2001; Snow, 1990). The sociocultural contexts of children's language learning have considerable impact on the nature of the language they have mastered by age four or five, particularly upon the ways children use language to interact with others, to show what they know, or to express themselves (cf., Heath, 1983; Schieffelin & Ochs, 1986).

The question of how language is developed has resulted in a longstanding controversy. Some scholars, like Chomsky (2002), hold the view that humans are equipped with innate language structures distinct from other cognitive capacities. Other scholars assert that language is developed through the interaction
between the organism and its cultural environment through general cognitive mechanisms (Bates, Elman, Johnson, Karmiloff-Smith, Parisi, & Plunkett, 1998; Tomasello, 2008). The question about the influence of language on cognition has also been the center of many discussions among psychologists, linguists, and anthropologists. Although there is not one clear undisputed answer, there seems to be some agreement on the ways that cognition and language are influenced by one another.

There is consensus on the fact that language, cognition, and culture do not act independently of biological processes during the early years of development (Cole & Cacigas, 2010). It is also widely accepted that, in the early stages of development, children link linguistic forms directly to concepts and categories that they have already established in the course of their non-linguistic cognitive development (Bowerman, 2000). However, continuous disagreement continues to permeate theory and research on specific areas of language acquisition. One of these areas is semantic (meaning) development. The key question regarding semantic development is how children end up mastering the semantic patterns of their own language. Significant variation in semantic structuring has been documented for a variety of conceptual domains, including the notion of causality (Bowerman, 2000).

Choi and Bowerman (1991) found linguistic differences in children’s ways of expressing spatial concepts at a very young age. Comparing early use of spatial words at ages one and three years in children speaking English, Korean, and Tzotzil, a Mayan language, they found that, from the earliest production of language, spatial words are associated with language-specific categories of events. It appears that, while there might be a universal sequence of word production of words related to spatial concepts, children use them to convey slightly different meanings in alignment with their native languages. One example is how children expressed the motion of falling. While English-speaking children used the terms “fall” or “fall down” for a broad range of uncontrolled motions downward, Korean-speaking children distinguished between falls from a higher to a lower place (e.g., a pencil falls from a table: *tttelecita*) and falls onto the same surface (e.g., a child falls on the floor, a tower is knocked over: *nemecita*).

Bowerman (1996) and Choi (1997) conducted research to investigate the early development of special semantic categories in children who grow in cultures with different languages. Their study showed that children as young as two to two years and five months of age who are learning different languages classify spatial relationships differently for purposes of talking about them. The differences found were closely related to how the concept of space is used in different languages. Children who are in the process of developing English, Dutch, and Korean use different verbal classifications for actions like putting a block into a pan, putting a small book into a fitted case, putting a Lego piece on a stack of Legos, putting a ring on a finger, putting a cup on a table, putting a hat on someone’s head, and putting a towel on a towel rack. While English speaking children use the words “in” and “on” to verbally classify all these actions, Dutch speaking children use four different terms (“in,” “om,” “op,” and “aan”) to show different concrete spatial relationships. Korean speaking children use five terms to show
through general cognitive development (Garfay & Plunkett, 1998; Luria, 1976). Language on cognition has been a focus of psychologists, linguists, and scientists as an answer, there seems to be a strong link between language and cognitive development. Language and, culture do not act alone in the development of spatial language. The early stages of development in children include the mental concepts and categories that are consistent with non-linguistic cognitive development (Lewis, 2002). Language acquisition continues to influence the categorization of events. One of the key questions regarding language acquisition is the semantic patterns that guide the structuring has been the debate on the notion of causal-ordering in children's ways of thinking about events (Luk, 2005). The early use of spatial language includes English, Korean, and Turkish children. The earliest production of language includes these categories of events. It is possible that the use of word production of these languages convey slightly different meanings. For example, in English, children used the terms “above” and “below” to describe actions downward, whereas in Korean, children used a higher to a lower surface for actions (Korean: secata).

To investigate the early use of language, Garfay and Plunkett (2001) asked children as young as two to three years old to classify objects using four different languages classify the objects. The different languages are used in different contexts. For example, in English, children are asked to point to a block put on a stack of blocks. In Dutch, children are asked to put a block on a stack of blocks. In Korean, children are asked to put a hat on something. Dutch speaking children are asked to classify the objects, English speaking children are asked to classify the objects, and Dutch speaking children are asked to classify the objects, French speaking children are asked to classify the objects, and Korean speaking children are asked to classify the objects.

Garfay and Plunkett (2001) asked children to classify the objects using five terms to show different positions. One of the terms, “nau,” is used to classify the objects. These outcomes show that, while children speaking different languages are learning spatial concepts at a similar age, they use different spatial words that represent different ways of thinking about those concepts. Language plays a critical role in how children categorize their world. Dutch speaking children, for instance, will be naturally disposed to make distinctions that English speaking children will not.

Additional research findings related to the variation in spatial terms and children's use of them are provided by de Leon (2001). She found that Tzotzil toddlers used different verbs that distinguish language-specific categories of position: “nau” be located faced down/upside down, “kot” be located standing on all fours, “pak” be located on the ground, and “kai” be located on a high surface.

Clearly, culture and language play a central role in cognitive development. While general patterns of cognitive and language development are found in children of all cultures, these patterns are influenced significantly by the culture and language of origin. As Nisbett and Norenzayan (2002) noted, societies differ in the cultural practices they promote by providing, through language, different sets of cognitive strategies to their young.

**Assessment and Cognition**

Research conducted by Saalbach and Imai (2007) demonstrates that, depending on what task is used to tap knowledge, different patterns of response may emerge. When a child is asked to choose what object goes with another, he or she may make a different choice than when asked what object shares a property with the first or what objects share the same name as the first.

It is increasingly accepted by the measurement community that the method of assessment affects the outcome. Abstract thinking, for example, is considered a universal capacity. However, the domains of application may vary across individuals and cultures. A car mechanic may be able to use abstract thinking when fixing problems in cars. On the other hand, he/she may perform poorly when attempting to apply the same logical operations to other domains.

Another example, provided by van de Vijver (2006), highlights this situation in relation to mathematical thinking. In one experiment, a group of women were asked which of two cans of peanuts they would buy based on comparing their prices: Can A, weighing 10 oz. for 90 cents, or Can B, weighing 4 oz. for 45 cents. In another test, the same women were asked to compare the ratios 90/45 and 10/4. From a mathematical perspective, the two problems are equivalent; however, from a psychological perspective, they are perceived and solved differently. The former, concrete, version of the problem was correctly solved more frequently.

This phenomenon was also found with a group of Zinacanteco women in Mexico. These women can weave highly complex patterns. The women showed superior planning skills in a weaving task when they had to reproduce known patterns, but did not outperform non-weavers when the planning involved unfamiliar patterns. Planning skills acquired in the context of professional training did not generalize broadly across the cognitive spectrum (van de Vijver & Willemsen, 1993).
Cognitive Development, Culture, and School Assessment

What impact do cognitive and language research findings have or should they have on school assessment? In close alignment with findings in the fields of cognitive development and overall assessment research, Solano-Flores and Nelson-Barber (2001) argue that, because socio-cultural groups create meaning from experience in culturally determined ways,

individuals have predisposed notions on how to respond to questions, solve problems, and so forth. It follows that these predispositions influence the ways in which students interpret materials presented in tests and the ways in which they respond to test items.

Solano-Flores and Nelson-Barber (2001) indicate that the ways students make sense of science test items, for example, are influenced by the values, beliefs, experiences, communication patterns, teaching and learning styles, and epistemologies originating in their cultural background and socioeconomic conditions.

Solano-Flores and Nelson-Barber (2001) investigated how ways of thinking, communication patterns, and learning styles that permeate the cultures of students influenced the way in which they responded to standardized test items. They conducted a study with students from four different cultural groups included Chamorro and Carolinian students from the Commonwealth of the Northern Mariana Island, Yup’ik students from rural Alaska, and immigrant Latino students from rural Washington State. All students were administered one item from a set of two mathematics and two science items selected from a pool of released items of the National Assessment of Educational Progress issued in 1996. The study found that students’ demonstrated competence depended on the match between the demands of a task, the context in which it is embedded, and the culturally developed skills of the learner (Solano-Flores & Nelson-Barber, 2001).

In a study conducted by Nelson-Barber, Huang, Trumbull, Johnson, and Sexton (2008), the authors show the influence of cultural beliefs on the way that students respond to standardized test items. Figure 4.1 shows a science item of the National Assessment of Educational Progress and the response of a Hawaiian eighth grader as described in the study.

**Item:**

Bacteria and laboratory animals are sometimes used by scientists as model organisms when researching cures for human diseases such as cancer. Describe one possible advantage and one possible disadvantage of using bacteria as models to help find cures for human diseases.
Assessment

Very likely, the response to this item would be considered "incorrect," based on the possible "correct" responses provided by the item developers. The goal of the problem as stated in the NAEP Content Classification explanation is to engage students' "practical reasoning" by assessing their abilities to use and apply learned concepts in real-world applications. As Nelson-Barber et al. (2008) indicate, the students are prompted to respond to a "context-free" item. Therefore, they are free to imagine the setting for the item as well as how best to respond to the question from their own perspective.

Culture permeates all aspects of assessment, including methods, choices, and attitudes towards assessment. In a comparative study of assessment in French and English infant schools, Raveaud (2004) examines two different approaches to teaching and assessment from a socio-cultural perspective, relating assessment to teachers' culturally situated practices and values. While in the English "emergent writing" approach "spelling mistakes" are considered to be a central part of the constructive learning process, in the French school system children are expected to spell words "correctly" as soon as they start writing them so that they do not memorize them with mistakes.

The study illustrates how English teachers guide students through the writing process by encouraging students to re-think their answers ("Are you sure about that?"). providing positive comments ("You were close"). and avoiding negative statements ("Good try"). French teachers, on the other hand, refer explicitly to the students' mistakes (e.g., "That is wrong." "There is a mistake").

Different approaches to actual assessments were also presented for both systems. In the English system, students were evaluated in relation to several factors and not limited to whether their work was "right" or "wrong." Factors taken into account included progress made, diligence, and neatness. In the French system, students' progress is based solely on academic attainment. While French teachers were aware of how hard their pupils were trying, the progress they were making, and where their difficulties lay, their final assessment was based on their performance.

Raveaud discusses how these assessment systems are tied not just to the different pedagogies, but to a broader national culture and values. The relevance of Raveaud's findings to this discussion is that assessment practices, while perceived as objective and accurate, are also unconsciously tied to a set of societal judgments as to what is considered "correct" or "incorrect," "appropriate," or
“inappropriate.” Raveaud indicates that, because English children are used to a more “nurturing” approach, they would probably have a negative reaction to a French teacher’s comments. French children who are used to this system will not necessarily feel that the teacher is being harsh. A different impact was noted for immigrant children in French classrooms who were not used to this system.

In sum, there is evidence that culture and language permeate the ways in which we perceive reality, develop concepts, and create and respond to assessment tasks. Teachers need to make sure that, when they design, select, and use assessments, they provide students with the opportunity to demonstrate what they really know in culturally responsive and valid ways.

**Promoting Culturally Valid Assessment in the Classroom**

**Cultural Competence**

“Cultural competence” entails recognizing the differences among students and families from different cultural groups, responding to those differences positively, and being able to interact effectively in a range of cultural environments (Lindsey, Robins, & Terrell, 2003). Research indicates that, in order to promote high academic standards for all students, teachers must use an approach to mediate academic content with students’ cultural experience to make such content accessible, meaningful, and relevant (Lee & Fradd, 1998; Ladson-Billings, 1995). Ladson-Billings (2001) states that cultural competence is present in classrooms where the teacher: (1) understands culture and its role in education; (2) takes responsibility for learning about students’ culture and community; (3) uses students’ cultures as a basis for learning; and (4) promotes the flexible integration of the students’ local and global culture.

The first step in becoming culturally competent is to recognize that everyone has a culture or is a participant in a cultural community (Gutiérrez & Rogoff, 2003) and that culture plays a role in defining who we are, how we respond to each other, and how we learn. In the first section of this chapter we discussed how culture shapes cognition and language and how students from different backgrounds respond to assessment. Cultural competency encompasses being able to understand and appreciate how different cultures approach learning and how individual students interpret, react to classroom settings, instruction, and assessment. A culturally competent teacher is aware of his/her own culture as well as that of his or her students. Rather than imposing one way of approaching learning and assessment, he or she learns to identify students’ different learning styles and uses the information to provide them with culturally responsive instruction and culturally valid assessments. The culturally competent teacher is also aware that not all members of a given culture approach learning in exactly the same way and does not stereotype or generalize his or her findings on individual students to all the students who belong to the same cultural group. These teachers are aware of their own prejudices and are constantly trying to learn more accurate information about their students’ cultural backgrounds.
What Teachers Can Do

Selecting and Using Classroom Assessments to Promote Cultural Validity

In the previous section of this chapter we discussed the influence of culture and language on cognition. This section discusses some strategies teachers can use in the classroom to promote culturally valid assessments. What strategies can teachers use in the classroom to promote culturally valid assessments? What follows is a summary of selected strategies.

Use Different Types of Assessment to Assess Student Knowledge

As a general rule, teachers should use a variety of assessment tools, choosing in each case the method that best captures intended knowledge and skills in their context of use. Teachers need to make sure that classroom assessments: (1) provide valid information about student learning for both teacher and student, so that they can adapt instruction and the students can set learning goals; (2) are flexible enough to accommodate differences in students’ linguistic and cultural backgrounds; and (3) offer choices to students about how and when they will demonstrate what they have learned.

The value of using a wide variety of assessment techniques can never be underestimated, if these three conditions are to be met. Different learning goals might require different types of assessment, and the type of assessment interacts in complex ways with the very nature of what is being assessed. For example, being able to retell a story after reading might be fundamentally different learning from being able to answer questions about the story (Gredler & Johnson, 2004). Thus, even for the same learning objective, there are important reasons to assess learning in more than one way.

Also, it is important to select assessments based on the cultural preferences, characteristics, needs, and strengths of your students. For example, some common formats, such as multiple-choice and true/false, may be less preferred by American Indian/Alaska Native students because they force a single answer rather than reflection and respect for more than one perspective (Macias, 1989; Nelson-Barber & Trumbull, 2007). Individual classroom questioning in the class by teachers might inhibit American Indian students (Swisher & Dyke, 1992), Alaska Native students (Eriks-Brophy & Crago, 1993), and Native Hawaiian students (Au & Kawakami, 1994), who may have a preference for more collective approaches. English language learners (ELLs) might respond better to assessments that do not rely heavily on English language proficiency or on knowledge of specialized or sophisticated vocabulary that has not been taught or is not necessary.

Drawing or building models to represent complex relationships may allow students who are still learning English to demonstrate their understanding of concepts (Lee & Fradd, 1998). Of course, academic language proficiency is intimately intertwined with subject matter knowledge, so there is a tension between
making assessments accessible to ELLs and using appropriate academic language on assessments (cf., Wolf et al., 2008).

Students should be allowed to demonstrate their competence using the particular conditions that show them to their best advantage (at least as one of the ways in which they are assessed) (Shepard, 2000). This could include selecting an oral presentation instead of a written exam for students who perform better orally or including writing topics that are familiar to the students. At the same time, students should not always rely on the format that is most comfortable or easiest to handle. Effective instruction should focus on both areas of weakness and strength and should have increased and robust knowledge as a goal. For example, ELLs should have the opportunity to demonstrate their mathematical knowledge without the confounding effects of language proficiency, and at the same time, should be working to improve their mathematical communication (Shepard, 2000).

Conduct Classroom Observations

Observing student attitudes and performance during instruction and assessment is key to knowing the type of assessment that yields best results in depicting student knowledge. Gathering information about cultural preferences, individual styles, degree of understanding, and comfort level with different type of assessments can help teachers determine what assessments to use and how to best use them. All this information is very important to identify, document, and later use for improving culturally responsive instruction and culturally valid assessments.

The first step in conducting observations is to identify a specific purpose and setting for the observation. It is very important to ensure that selected contexts and situations provide adequate opportunities to observe how students respond to different assessment tasks. Opportunities to observe student responses to specific assessment tasks will arise in a variety of settings. For example, they may occur when a student is expressing his or her thoughts about how and why an approach or a solution makes sense, responding to the thoughts of fellow students, making choices about tasks or materials to use, or participating in class discussions. Brief records documenting teacher observations, along with related copies of the student's written work, provide important tools to aid in making decisions about assessments.

In order to provide systematic observations of students, it is important to use a method that helps identify, document, and track student responses or reactions in a consistent and uniform way. How do students express and perform on different assessment tasks? For example, in being assessed on a given concept, does a given student perform better on multiple-choice items, short-answer items, essays, or oral presentations? Does this student do better using graphic diagrams or writing paragraphs; presenting individually or as part of a group? Being able to observe and document these facts allows teachers to tap into students' preferred and most effective way to express and demonstrate knowledge. Table 4.1 shows an example of a format for recording student reactions and performance in relation to different types of assessments.
### Table 4.1 Example of Observation Record

<table>
<thead>
<tr>
<th>Observations of individual students</th>
<th>Paper-and-pencil assessments</th>
<th>Essays</th>
<th>Visual representations (webs, graphs, illustrations)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multiple-choice, true–false</td>
<td>Fill-in-the-blank</td>
<td>Short-answer (sentences or paragraphs)</td>
</tr>
<tr>
<td>Luisa</td>
<td>Stared at questions but didn't answer them</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ya-han Pedro</td>
<td></td>
<td></td>
<td>Produced elaborate graph</td>
</tr>
</tbody>
</table>

Note
Adapted from: Gredler and Johnson (2004).
Teachers can use anecdotal records to complete the matrix. Anecdotal records consist of brief, written descriptions of concrete actions or events observed by the teacher. They are factual, not inferential, and require that several examples are obtained before conclusions are reached about the student (Gredler & Johnson, 2004).

These are some examples of behavior that teachers could observe and document:

_Luisa stares at the multiple-choice questions and spends a significant amount of time without answering any of them._

_Ya-Han, an ELL student, provides an elaborate graph about the concept of living things._

_Pedro, a student with language-based disabilities, frequently asks the meaning of words in the “fill in the blank” assessment._

It is important to emphasize that all notes should be concrete and factual, and not interpretations or evaluations. There are multiple ways of making observation notes using charts like the one above. Among the methods teachers have found to be useful include: using sticky notes to document individual students’ specific responses to different types of assessments during the assessment and then transferring those observations to a chart; or inserting observations directly into the observation chart.

Teachers may choose any method that works well for them. However, it is important that, whenever they are using anecdotal records, they follow a guideline to ensure validity and reliability in their observations. The guidelines in Table 4.2 will help in the process of collecting and documenting observations.

It is important to conduct these observations throughout the year. However, it is critical to conduct them at the beginning of the school year so that teachers can develop an awareness of students’ abilities and reactions to different types of assessments. Observations are always a first step in gathering information about students. Once a teacher has observed certain patterns of behaviors or responses, the next step is to try to understand what’s behind a given response. Is a given response possibly influenced by a cultural characteristic of the student’s background? Is the child experiencing difficulties because he/she is not English proficient? The next step is to find out more about these particular responses.

Observations combined with other forms of assessment contribute to a comprehensive view of students’ strengths, weaknesses, strategies, styles, and attitudes toward different tasks and learning. Teachers may use a portfolio system to collect observations, student work exemplifying particular standards, and various forms of assessment in a single place (Tierney, Carter, & Desai, 1991). Portfolios can be a useful tool in classrooms with diverse populations because they have the flexibility to reflect the context in which students are learning and link to the actual curriculum taught—in any language (cf., Koelsch & Estrin, 1996). For a portfolio system to be valid, attention does need to be given to the
Anecdotal records are a valuable tool for collecting events observed by teachers and parents. The following guidelines could help teachers and parents identify and record anecdotes:

1. Identify a purpose for the observation in advance.
   - Example: Student responses to different pen-and-pencil assessment tasks.
2. Select the activity or situation, focusing on one type of assessment at a time.
   - Example: Multiple-choice, fill-in-the-blank, short-answer, essays, visual representations.
3. Develop observational notes that provide information about a specific area of interest.
   - Example: Focus on observing and documenting target area.
4. Develop a systematic record to keep track of observations.
   - Example: Use observation notebook, sticky notes, observation chart.
5. Obtain adequate samples of a student's responses and behaviors prior to making an interpretation.
   - Example: Conduct observations of student responses to different assessment tasks on different days and different concepts.

Source: Adapted from: Gredler and Johnson (2004).

Criteria for selecting portfolio entries and judging student work (Kubiszyn & Borich, 2007).

Use Cognitive Interviews and Think-Alouds

These techniques can also be used in the classroom to gain understanding of student responses or approaches to different types of assessments. Cognitive interviews can be defined as a process by which the teacher asks a series of questions to find out students' reasoning in completing a particular task. Think-aloud is one of the cognitive interview methods that prompts students to verbalize their thoughts as they solve a problem or respond to a test item (Ericsson & Simon, 1993). The focus in the think-aloud is to gain access to student processes while completing a task or an assessment. Think-aloud is considered a powerful method because it provides information about students' thoughts while they are still in short-term memory, with relatively minor interference with task requirements (Hamilton, Nussbaum, & Snow, 1997). Both techniques allow teachers to develop a better understanding of why and how students respond to particular questions and assessment tasks.

Cognitive interviews are commonly used to: (1) assess students' comprehension of test items: (e.g., what does the student believe the item is about? What do specific words and phrases in the questions mean to the students?); and (2) help students retrieve relevant information (e.g., what information does the student need to recall in order to answer the question? What strategies does the student use to retrieve information?).

As mentioned above, providing students with the opportunity to explain their answers allows teachers to better understand the cognitive process by which
students come up with an answer. In addition, teachers can learn what testing formats present more or less cognitive demands (Hamilton et al., 1997). For example: Do students have more difficulty explaining a particular concept using a multiple-choice format or using a short-answer format? Do students use methods taught in class to respond to the questions? What other methods do they use to respond? In addition, and most important, this technique also helps teachers to explore how socio-economic, cultural, and linguistic factors might influence or determine students’ responses.

As previously discussed, all children bring to the learning process their own ways of interpreting the natural and social worlds, developed within their cultural environments, traditions, and personal circumstances. Therefore, their background might deeply influence the way they interpret questions and respond to them. Using cognitive interviews and think-aloud techniques helps teachers to have a clear idea of the students’ understanding of the tasks, how students process questions, and how they come up with answers to those questions.

The following example from Solano-Flores and Trumbull (2003) illustrates how socio-economic background might influence how students might interpret and respond to test items. (This item is also discussed in Trumbull & Solano-Flores, Chapter 2, this volume, from a different perspective.) Solano-Flores and Trumbull analyzed the responses of students with multiple cultural backgrounds to items from the National Assessment of Educational Progress (1996) public release. This is one of the items used in their study:

Sam can purchase his lunch at school. Each day he wants to have juice that costs 50 cents, a sandwich that costs 90 cents and fruit that costs 35 cents. His mother has only $1.00 bills. What is the least number of $1.00 bills that his mother should give him so he will have enough money to buy lunch for five days?

The researchers interviewed a low-income student about this item.

RESEARCHER (R): Now what do you think this question is asking from you? What is it about?
STUDENT (S): It’s about Sam and he wants to buy his juice, his sandwich, and his fruits.
R: mm-hm.
S: For lunch. Maybe he was hungry. But, I think his mom didn’t have enough money.
R: Why?
S: Because she only had one dollar bill.
(R asks a question that S does not understand; R rephrases)
R: So, what did you need to know to be able to answer this problem?
S: I had to know, um, do, um, I had to do the math problems, like, how much money needed, um, check how many money he needed for five days and how much, uh, juice and sandwich costs and his mother only, his mother only had one dollar bill and, and that’s all.
Given his low socio-economic status, this student may have been more concerned about the "fact" (his interpretation) that the mother only had $1.00 (a situation that he was probably familiar with) than the rest of the information provided and the specific response requested in the item. This interpretation of the item made the student unable to respond to the item correctly. If the researchers had not interviewed the student about his understanding of the problem, they would not have been able to have insight on how the way the item was written influenced the student's interpretation and response.

Check Prior Knowledge and Experience

Classroom practices should include assessment of students' relevant knowledge and experience to address the fact that new learning is shaped by prior knowledge and cultural background. The impact of using prior knowledge to elicit effective and culturally responsive learning has been documented (e.g., Alexander, 1996). Students become active learners and perform better on assessments that take into account their personal experience, prior knowledge, and cultural background (Au & Jordan, 1981; Nelson-Barber et al., 2008; Pressley, Wood, Woloshyn, Martin, King, & Menke, 1992).

As discussed earlier, students' socio-economic, language, and cultural backgrounds influence the way they relate to school as well as learning content and assessment. Knowing students' prior knowledge and experience can help teachers plan both instruction and assessment. Familiarity with the places and cultures in which students have been reared help teachers to integrate students' previous experiences in instruction to support their learning of new content. Knowing about students' backgrounds helps teachers to understand their preferences and learning styles, have an appropriate interpretation of their responses to test items, and, ultimately, to select valid assessment tools for use in the classroom.

The following example from *Toolkit98* by the Regional Educational Laboratories used by Kusimo, Ritter, Busick, Ferguson, Trumbull, and Solano-Flores (2000) shows how having information about a student's background can help to understand and clarify a student's answers.

Test item:

Four birds were sitting on a fence. A farmer threw a stone that hit one of the birds. How many birds were left on the fence?

The anticipated correct answer was 3. However, it is possible that children who grew up on farms would respond differently. Farm children would know that if there was a stone thrown toward a fence, no matter how many birds were hit, *all* would fly. Based on their experience, the correct answer would be 0.

Without having information about a student's background, and using this information to review and score the responses, a teacher might penalize students for having the wrong answer although their rationale was correct.
Gredler and Johnson (2004) provide several strategies for accessing prior knowledge and experience. These include:

- Unstructured discussions: Teachers ask students about their experience with the topic. It relies on students’ freely recounting their experience with a particular topic or knowledge about a concept or words.
- Free recall and word association: Teachers ask students to think of everything they can about the topic, concept, or word.
- Structured questions: Teachers develop questions on topics or concepts. They can then ask the questions orally or in writing; individually or in groups. For example, for the sub-topic “tropical forest,” the questions may include: “How could you describe the tropical forest?” “What kinds of animals live in the tropical forest?” The importance of structured questions is that they can elicit information about student knowledge and thinking. Most important, they can yield information about how students perceive, relate to, and understand different topics.

The emphasis on using these strategies should be on gathering information about the student’s knowledge as well as cultural background. Efforts should be made to go beyond the “correct” or “incorrect” answers in order to gain knowledge and understanding of the student’s overall cultural background and style responding to test items. As Shepard (2000) recommends, it is essential that teachers become familiar with relevant experiences and discourse patterns in diverse communities.

Trumbull and Koelsch, Chapter 9, this volume, illustrate how a district assessment keyed to local standards failed to engage students, and how a revised assessment that connected the tasks to students’ experiences and language proved to be successful.

Assess Understanding of Key Terms Used in Different Subject Areas

An example provided by Luykx, Lee, Mahotiere, Lester, Hart, and Deaktor (2007) highlights how students might interpret science terms with reference to their everyday meanings or similarities to terms in their native languages rather than their specialized scientific meaning. (The issue of domain-specific registers is taken up in Trumbull & Solano-Flores, Chapter 2, this volume.)

Luykx et al. (2007) conducted a study that focused on cultural and linguistic interference in the open-ended responses of third- and fourth-grade students on paper-and-pencil science tests. They examined children’s responses linked to: (1) linguistic influences in terms of phonological, orthographic, or semantic features from children’s home languages; (2) cultural influences in terms of specific knowledge or beliefs deriving from children’s homes and communities, and implicit cultural assumptions underlying student responses; and (3) language and cultural features of children’s written discourse.

The researchers found that, for example, the common use in some Spanish speaking countries of the word gaseosa (“gaseous”) refers to soft drinks (a liquid) and was a cause of confusion with the term “gas” in science. They also found that
among Spanish speaking children, there was a confusion with the abbreviations F (Fahrenheit) and C (Celsius) with the Spanish abbreviations for frio = cold = Fahrenheit (F) and caliente = hot = Celsius (C).

These experiences show that, when assessing prior knowledge and experience, it is very important to assess students' knowledge of key terms used in the content areas or in specific courses. In developing and using assessment tasks, teachers need to ask, Do all my students have a common understanding of the key terms used? Does language or do cultural factors affect the ways in which my students use and understand the different terms?

Make Sure Students Understand the Purpose of a Specific Assessment

In order to properly assess what students know, teachers need to be sure that students understand the main purpose of a given assessment; what is being specifically assessed; and why it is important. When teachers do not clearly explain what they are specifically looking for in students' answers, students might not be able to respond in the specific way teachers expect based on many factors, including their cultural backgrounds.

Solano-Flores (2008) asserts that certain characteristics of tests and the ways in which they are administered favor communication styles that are not necessarily universal. For example, using rubrics that highly value long written responses to open-ended questions may negatively affect the scores of children from cultural groups in which giving long responses to questions asked by adults is perceived as impolite (Heath, 1983).

Teachers' unspoken expectations in assessments might not be understood by students from cultural groups who may have different responses. Trumbull and Solano-Flores, Chapter 2 this volume, provide examples of how teachers' lack of explanation of their expectations can impact students understanding of tasks. It is important to help students bridge between the communication patterns in their home/culture and the expectations in the classroom. But the differences between home and school communication expectations may not be evident to students (Gee, 1996). We need to provide students with a clear idea of what the learning target is and what specific communication patterns or types of responses are expected in the assessments used.

Kopriva (2000) recommends that, in order to help students have clear expectations regarding assessment questions, teachers should do the following:

1. Clearly state student responses options. For instance, teachers should indicate and provide examples of acceptable types of responses (written responses, pictures, diagrams, charts, etc.).

2. Let students know how their answers will be evaluated. The evaluation criteria should be clear to the students through directions or in rubrics provided and discussed with the students prior to the assessment.

The best results are achieved when students are more involved in understanding and providing input about the assessments (Kusimo et al., 2000). Helping
students understand expectations allows them to recognize how to improve their own performance. Clarifying what is expected helps students determine how to integrate and select components of their own cultural background to respond appropriately.

**Contextualize Assessment Tasks**

In order to ensure culturally valid assessment, it is important to create and use assessment formats and frame and pose questions taking into consideration the culture and background of the student. Assessments that allow drawing upon personal experience and creating one’s own meaningful contexts have been shown to be a successful method for eliciting knowledge of Navajo students (e.g., Shields, 1997). Similar successful results were obtained elsewhere when the assessments chosen emphasized local cultural contexts and the evaluation relied on the cooperation of the group rather than the performance of the individual (Nelson-Barber, Trumbull, & Wenn, 2000).

As we have mentioned earlier, cultural norms may influence the way in which students interpret and solve problems (Kopriva & Sexton, 1999). An example provided by *Making Assessment Work for Everyone* (Kusimo et al. 2000) helps clarify this issue:

Students are asked to create a fair race. Students are expected to create a racecourse in which each contestant runs the same distance. Those from cultures that do not emphasize competition may interpret the word “fair” in a different way and create shorter distances for slower runners, as if the item asked them to create a racecourse in which all contestants have equal chances of winning.

(p. 146)

The example shows how a teacher can anticipate the way in which students’ culturally influenced values can influence the way in which they respond to the question posed. Consistent with this notion, Nelson-Barber et al. (2008) demonstrated, in their study with American Indians, how enriching the context of items allows all students to imagine or understand why the concept could be important in his/her life, or in someone else’s situation; make a link between the concept that he or she was likely to be exposed to through reading, watching, or storytelling in class or at home; and actively think about, research, explore, or interact with the concept.

**Teach and Prepare Students as to How to Best Respond to Different Types of Assessments**

While providing students from diverse backgrounds with culturally valid assessments, it is also important to prepare those students to be able to respond to different types of assessments. Teachers can help students bridge their cultural and school background by offering them options and teaching them how to respond to
specific formats and types of questioning. As Hamilton et al. (1997) indicate, if students do not know that they are expected to respond in a certain way and using specific skills, the assessment may not yield a valid picture of their capabilities.

One of the main goals of learning is that students are able to have a deep understanding of concepts and to generalize and transfer knowledge to new situations. True understanding is flexible, connected, and generalizable (Shepard, 2000). Learning is more likely to be transferred if students have the opportunity to practice and apply their knowledge in different settings and ways (Bransford, 1979). Teachers need to help students to generalize and transfer their knowledge from one situation to another in a culturally responsive way. This applies both to instruction and to assessment. As Okhee Lee (2003) indicates, learning and achievement occur when students successfully participate in Western, mainstream approaches to science or other subjects, while also valuing alternative ways of knowing in their everyday worlds. This balanced orientation emphasizes academic achievement and cultural identity.

Conclusion

Providing students from diverse backgrounds with equitable and valid assessments is a challenge that needs to be addressed in order to ensure that ALL students have an opportunity to succeed. There is no question that culture influences and impacts cognition and, therefore, the ways that students respond to assessment tasks. As the population in the nation’s schools becomes more linguistically and culturally diverse, it is essential to promote culturally valid assessments in the classrooms. This chapter attempts to contribute to a better understanding on the importance of exploring learning and assessment from a developmental and socio-cultural perspective, and using research findings to promote equity and valid assessments in the classrooms. The chapter first provided a brief discussion and summary of the impact of culture and language in cognition resulting in the development of ways of knowing and understanding from a cross-cultural perspective. Second, based on these research findings, it emphasized the importance of conducting equitable and culturally valid assessments in the classroom. Finally, the chapter presented teachers with selected strategies to assess students from diverse cultural and linguistic backgrounds.

References


