

# The Principles of Cognitive Diagnostic Assessment of English Reading in Senior High School

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**Abstract:** In recent years, due to the cognitive diagnostic assessment can provide diagnostic feedback for language learners and promote language learning, it has received more and more attention and its significance has been widely recognized. This paper will sort out and summarize the cognitive diagnostic assessment of high school English reading, and summarize the principles of cognitive diagnostic assessment and its enlightenment to high school English reading teaching.

**Keywords:** Cognitive diagnostic assessment; High school English; Reading ability

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## 1. Introduction

To measure English learners' mastery level, some language tests have emerged. Based on test theory, cognitive diagnostic assessment gained a lot of attention in the field of language testing, for it can provide diagnostic feedback to learners and ultimately facilitate language learning. As one of the most important skills in language learning, reading ability is an important indicator of English proficiency. However, many learners do not know how to improve their English reading skills. Therefore, a cognitive diagnostic assessment of English reading skills is necessary. This study attempts to explore how to use cognitive diagnosis methods to provide high school students with a diagnosis of their English reading ability and find specific methods to improve their English reading ability based on cognitive diagnosis assessment and existing research.

## 2. Literature Review

### 2.1 Definition of Cognitive Diagnostic Assessment

Cognitive diagnostic assessment is defined as a new measurement method by some scholars, which is used to characterize students' knowledge structure and processing skills, and help to interpret and predict students' performance, so as to enhance students' learning and teachers' guidance to students. Lee & Sawaki saw cognitive diagnostic assessment as a method that combined cognitive psychology with psychometric modeling to assess learners' mastery of knowledge and skills in specific assessment domains. Similarly, Kim argued that cognitive diagnostic assessment was a tool that combined modern educational measurement methods with cognitive psychology to not only estimate multiple attributes of test takers, but also extract detailed information about test takers' strengths and weaknesses. In summary, most researchers define cognitive diagnostic assessment as a new way to assess a student's skill mastery.

### 2.2 The Theoretical Basis of Cognitive Diagnostic Assessment

The implementation of cognitive diagnostic assessment should be based on cognitive psychology, use various research methods of cognitive psychology to conduct cognitive analysis of the knowledge, skills, strategies, cognitive processing and other variables involved in the successful completion of the test project, so as to obtain a mental model of the measurement task. The role of mental models is to integrate the theories of cognitive psychology, that is, to integrate the attributes of cognitive diagnostic items into a suitable mathematical model, and then build a cognitive diagnostic model. In conclusion, the cognitive diagnostic assessment of high school students' English reading ability is inseparable from the development of cognitive psychology, modern statistical mathematics and computer science, as well as the participation of English reading experts and teachers.

### 2.3 English Reading Attributes

Attribute refers to the knowledge, strategies, thinking processes and problem-solving skills that the test taker uses to complete the target task successfully. Many scholars have developed a list of various English reading attributes. However, some English reading attributes lack effective quantitative validation. In response to these problems, Du Wenbo and Ma Xiaomei constructed a list of English

reading attributes for Chinese students. They believe that from a cognitive point of view, English reading attributes, such as understanding the literal meaning of sentences, understanding the literal meaning of discourse, locating relevant information, etc., are surface coding attributes, while other English reading attributes, from word deduction, coherent contextual reasoning, refined reasoning, comprehensive summary to exclusion of alternative choices, are discourse representation attributes and situational model attributes, which belong to higher-level attributes. Considering that this article explores the English reading ability of Chinese high school students, Du and Ma's list of English reading attributes are used.

### **3. Principles of Cognitive Diagnostic Assessment**

The first principle is that it is not the test that is diagnosed, but the user of the test. This user is usually a teacher who needs to make an informed diagnosis through the process of listening or observing, and then use a range of assessment tools, their informed judgment, and the expertise of others to form a result about the nature of the particular problem. They need to interpret information from a range of sources, while also relying on the observations and expertise of others.

The second principle is that the instrument itself should be designed to be user-friendly, targeted, discrete, and efficient to assist the teacher in making a diagnosis. Diagnostic tests should be adapted to classroom management, designed by trained teachers (or other experienced language teaching professionals) or assembled (with the help of existing toolkits), and should provide students with rich and detailed feedback. Most importantly, useful test instruments are designed with specific diagnostic purposes.

The third principle is that the diagnostic assessment process should include perspectives from different stakeholders, including learners' self-assessment. As the interviewee noted, a range of people were involved in the process, which was often initiated by informal observation of the issue by key stakeholders.

The fourth principle is that, ideally, diagnostic assessment should be embedded in a system that takes into account four diagnostic stages: (1) listening/observing, (2) initial assessment, (3) use of tools, testing, expert's help, and (4) decision-making. Many current diagnostic tests can be said to start at stage (3), that is, all people use general diagnostic tests rather than the more targeted measures selected according to stages (1) and (2). Such large-scale diagnostic tests can also play a role (especially in post-admission language assessments for university courses), and tailored diagnostic assessments suggested above are much more difficult to implement in these cases.

The fifth principle is that, if possible, diagnostic assessment should be linked to future treatment. While in some areas treatment is inherent in the diagnosis, in others it can also be a separate process, with different respondents stressing the need for a specific remedial action. In other words, a diagnostic language test should lead to the generation of an intervention, and the envisaged intervention or treatment should be teachable, or the action taken by the learner should lead to an improvement in learner performance.

### **4. The Enlightenment of Cognitive Diagnostic Assessment on English Reading Teaching in Senior High School**

If a teacher is considered as a diagnostician, it is essential that the teacher is adequately trained and developed to develop an competent knowledge base so that they can make an informed diagnostic assessment. Therefore, research needs to find out the best way to prepare teachers for diagnostic work (pre-service or in-service). This will necessarily involve the development of a knowledge base for second language acquisition, as well as familiarity with a range of tools that can be used to diagnose learner development.

The second principle relates to the development and dissemination of well-designed and effective assessment tools. This is the focus of some large-scale projects, such as DIALUKI, which is exploring a range of linguistic, cognitive and motivational variables to predict the strengths and weaknesses of reading and writing in a second or foreign language in order to develop diagnostic tools. High school English teachers should learn and use these tools in their teaching and design targeted teaching activities and assignments for more accurate and effective assessment.

For many years, self-assessment has been seen as a useful parallel feature of diagnostic assessment. Therefore, self-assessment needs to be meaningfully integrated into diagnostic decision-making. Students can continuously improve their English reading ability by improving their independent learning ability, focusing on their weaknesses and strengths in English reading ability, and conducting more extracurricular reading and reinforcement exercises.

Diagnosis should be an embedded process, as far as possible in the classroom, and feed back into the lesson. Therefore, we need more classroom-based assessment studies, with a special focus on the diagnostic process, and a clearer understanding of the interface between diagnosis and treatment in order to develop plans that can better achieve this in everyday classroom settings. Schools and

education departments can also conduct large-scale cognitive diagnostic tests and conduct cognitive diagnostic assessments to measure students' English reading ability, develop supplementary teaching materials, and strengthen English reading courses.

Investigations into the effectiveness of various treatments or interventions based on diagnosis are needed. However, diagnostic assessment studies may focus on the effectiveness of interventions on individual cases – in this type of study, the focus is on case study methods. Since different reading level groups have different mastery of English reading attributes, therefore, in the teaching process, teachers should carry out personalized intervention guidance. They can design corresponding teaching activities for different groups to help students improve their mastery of English reading attributes and improve their reading skills more effectively.

## 5. Conclusion

This article aims to explore the English reading ability of high school students and provide cognitive diagnostic information. Based on the framework of English reading attributes, the cognitive diagnosis assessment of high school students' English reading ability is sorted out, the five principles of cognitive diagnosis assessment are summarized, and the corresponding teaching enlightenment is put forward. It should also be added that diagnostic assessment itself needs to be placed within the context of other assessment practices routinely performed both inside and outside the classroom. We also need to emphasize that diagnostic assessment is just one type of assessment that provides useful information for students and teachers, and that diagnosis is useful for identifying areas where learners need additional help, but it should not be done separately from other types of formative assessment, which provide important feedback on strengths. As educators, we should strive to strike a balance in the assessment process and commit to making diagnostic assessment part of instructional assessment.

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