

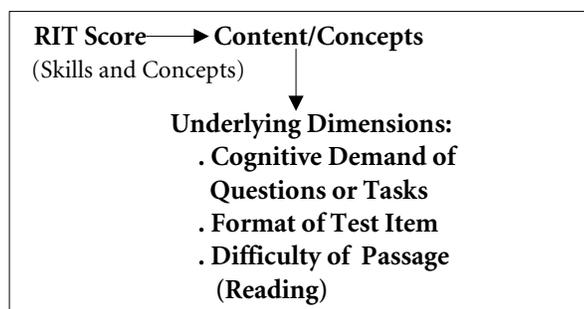
# Research Concepts

## Research Concepts

RIT scores represent both the difficulty of test items and the achievement of students. A higher score represents a student's ability to perform more complex skills and understand more difficult concepts. The skill or concept, however, is only one factor that affects item difficulty. The cognitive demand of a task, the difficulty of a reading passage, and the format or presentation of an item, all affect difficulty. For this reason, it should not be assumed that a 230 RIT concept or skill can only be understood or performed by students with a score of 230 or above. Teachers can often make these concepts accessible to lower performing students by presenting them in a simpler, more structured format.

### Underlying Dimensions

Figure 1 shows subtle underlying dimensions that can influence the difficulty of test items.



**Figure 1 Underlying Dimensions Affecting RIT Scores**

Students who have truly mastered a concept will be able to answer questions about that concept presented in a variety of formats. They can answer questions about the concept, even when the concept may be embedded in a complex problem. More importantly, teachers can make concepts more accessible or more challenging to students by changing these underlying factors when offering instruction to students.

### *Cognitive Demand*

Cognitive demand captures both the complexity of the task and the type of thinking (the complex thinking part) required to resolve it.

Our item banks contain items of varying cognitive complexity. For example, one item may ask a student to analyze three short passages and identify one

that makes an *ad hominem* argument (where a person argues by attacking the person rather than attacking the logic or evidence behind the argument) which is a task that requires complex thinking (analysis), but this task may not require much cognitive demand. Asking the same student to read three complex opinion pieces from a newspaper and identify logical fallacies committed in each is a task that requires the same form of complex thinking (it's still an analysis task), but has much greater cognitive demand because the student was not told which fallacy to look for and because the opinion pieces were not intentionally designed to contain a fallacy.

### ***Format of the Test Item***

Testing format can influence test scores. For example, in the classroom, mathematics problems may have only been presented in a vertical format. However, NWEA tests present mathematics problems both vertically and horizontally. Story problems may also represent a different orientation by their textual representation. Where the two latter formats deviate from mathematics problems that a student has been exposed to (horizontal formatting and textual representation), these variations may influence test scores.

### ***Difficulty of the Passage***

Reading questions contain three parts:

1. A passage for the student to read.
2. A question for the student to answer.
3. A choice of answers from which the student selects.

All three of these affect the RIT value of the reading question.

For example, asking the student to identify the main character in a passage is usually easy. However, offering the student a selection from Dante's *The Inferno* and asking him or her to do the same thing would be quite difficult because the middle-English vocabulary in the passage makes it denser and more difficult to understand.

Thus, when the assessment suggests that "distinguish fact from opinion" is a concept associated with a RIT value of 220, we need to remember that offering the student passages that are easy to read that do not offer much distracting information may end up with a RIT value as low as 200 or 210. Conversely, offering the same concept with a dense passage and a lot of distracting information may raise the difficulty of the task to a RIT value of 240.

### **Understanding Nuances**

With an understanding of the underlying dimensions that influence test scores, the nuances of learning continuum statements within DesCartes are easier to interpret.

#### **Example**

A two-digit division problem may require higher-level conceptual knowledge. If a student is asked to multiply 10 by 10, the RIT value of the task is somewhat low because most students know the answer. However, the RIT value associated with two-digit multiplication is much higher when a student is asked to multiply 68 by 73.

If teachers understand that the difference is in cognitive demand, which is independent of format, then the process of interpreting scores using the learning continuum statements in DesCartes becomes more flexible and less rigid. There is an assumption that as a student moves up through the grades, the content becomes more difficult; however, this may not always be the case.

NWEA's purpose is to help teachers understand and use DesCartes as a tool, and to understand that there are more dimensions than content and concepts that contribute to interpretation, such as cognitive demand, format of test item, and passage. It is important to remember that RIT values do not necessarily follow the same sequence that the grade-level curriculum might follow.