Using Idea Maps to Interpret Students' Scaled Scores

The idea map is a way of visually depicting the difficulty of the test questions. The numbers on the left are the scaled scores. The boxes on the right outline the range of scaled scores for the questions assessing the idea described in the box. Boxes toward the bottom of the map are easier and boxes toward the top of the map are more difficult. These maps can be used to determine what ideas students have likely mastered. A user can locate a student's scaled score on the left and then draw a line to the right to see what boxes correspond to that score. When the student's score matches the idea's score, the student has a 50% chance of responding correctly to the questions testing that idea. When the student's score is higher than the box, the student has a greater than 50% chance of responding correctly. When a student's score is lower than the box, the student has a less than 50% chance of responding correctly. For example, Figure 1 shows a sample map for the questions aligned to elastic potential energy. A score of 490 cuts through the lower edges of the top two boxes. This indicates that this student has likely mastered the ideas below 490 (the more an object is stretched the farther it will go when released and elastic potential energy depends on how much an object is stretched). Because 490 cuts through the bottom of the top boxes, it is likely that this student is just starting to develop the idea related to the difficulty to stretch and the idea about the changes in the distances between atoms and molecules.

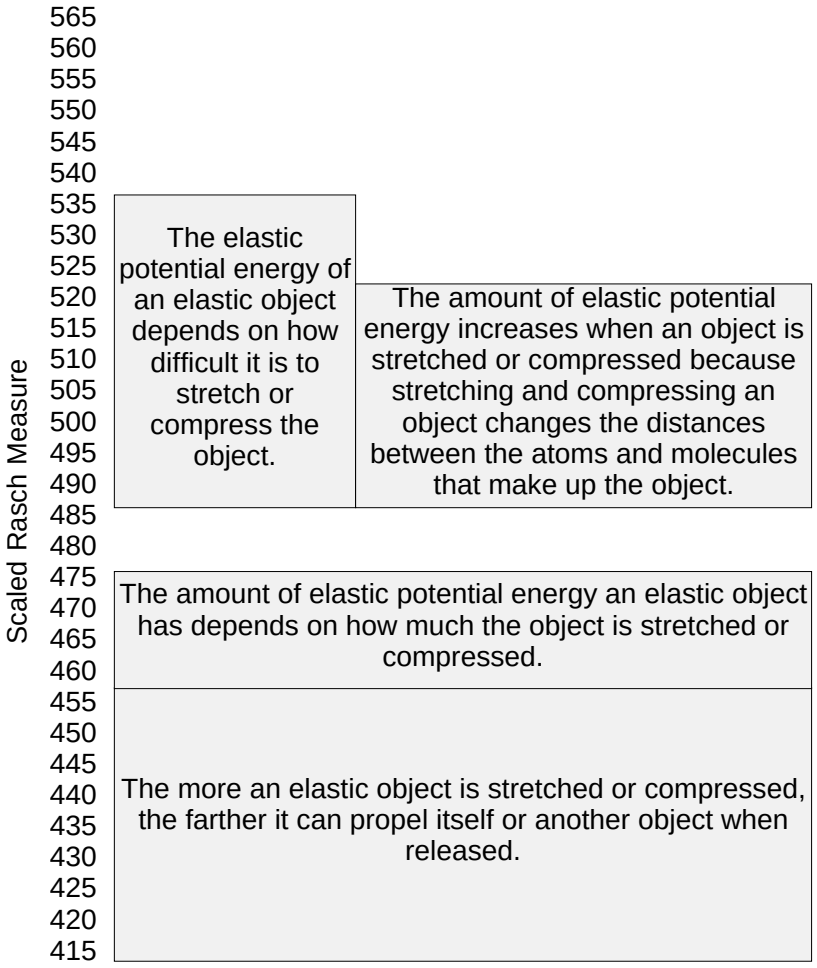

Figure 1: Map of ideas related to elastic potential energy

Figure 2 shows a sample map for the questions aligned to conduction. A score of 490 on this map cuts through the box representing the intermediate level of conduction. This indicates that this student has likely mastered the ideas below 490 (the more phenomenological basic level understanding of conduction) and is developing the intermediate level idea. However, this student has not begun to understand the advanced level represented by the box on the far right. On this map, the small box at 505 represents a basic level question that was more difficult than the other basic level questions. This question involved placing cold butter on very hot corn. Some students think that objects at the extreme ends of the temperature range tend to change the temperature of objects with which they are in contact but don't change temperature themselves. This misconception was embedded in the test question as a distractor which made this question more difficult that the other questions that did not include this misconception.

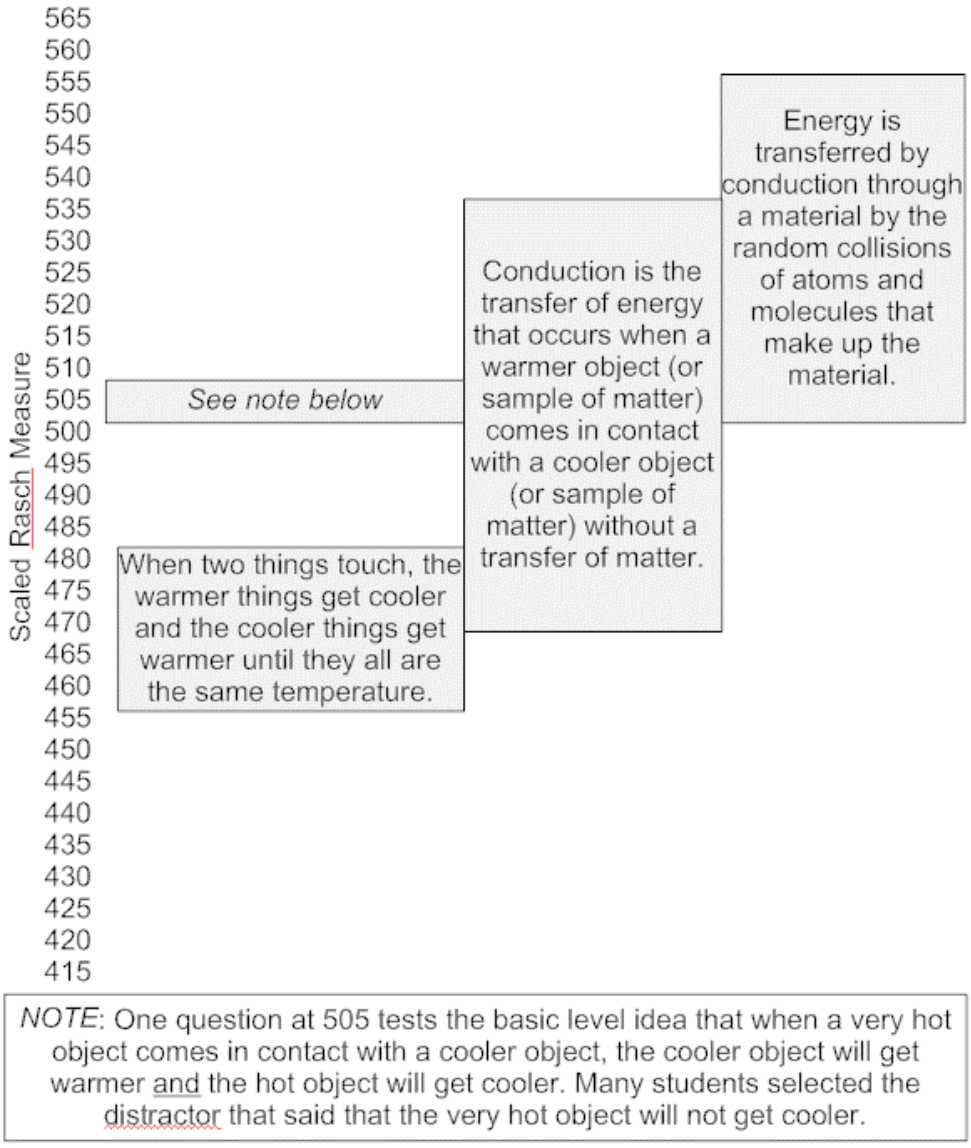

Figure 2: Map of ideas related to conduction