Peer grading can have many benefits in education, including a reduction in the time instructors spend grading and an opportunity for students to learn through their analysis of others' work. However, when not handled properly, peer grading can be unreliable and may result in grades that are vastly different from those which a student truly deserves. Therefore, any peer grading system used in a classroom must consider the potential for graders to generate inaccurate grades. One such system is the PeerRank rule proposed by Toby Walsh, which uses an iterative, linear algebra based process reminiscent of the Google PageRank algorithm in order to produce grades by weighting the peer grades with the graders' accuracies. However, this system has certain properties which make it less than ideal for peer grading in the classroom. We propose a modification of PeerRank that attempts to make the system more applicable in a classroom environment by incorporating the concept of "ground truth" to provide a basis for accuracy. We then perform a series of experiments to compare the accuracy of our method to that of PeerRank. We conclude that, in cases where a grader's accuracy in grading others is a reflection of their own grade, our method produces grades with a similar accuracy to PeerRank. However, in cases where a grader's accuracy and grade are unrelated, our method performs more accurately than PeerRank.