

# Peer Instruction: Assisting Active Learning in Science Education

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*“Education is not the filling of a pail, but the lighting of a fire.”  
–William Butler Yeats*

PEER INSTRUCTION is an interactive teaching method advanced by Harvard University professor Eric Mazur. It is a form of active learning meant to increase students’ engagement and collaboration in the classroom, using conceptual tests (or ConcepTests) and teaching aids like the clicker (Zhu & Dong, 2018). Research demonstrates that it assists with students’ grasp and application of disciplinary knowledge (Zheng et al, 2020).

With peer instruction, the teacher divides a lesson into several sections with each of them covering a number of concepts. The students are assigned pre-class preparation tasks, and in the class, the teacher administers to them a test for each section and gathers answers from each individual student using the clicker or flashcard. When more than 70% of the students give correct answers, the teacher will only provide brief instruction on the section tested and quickly move on to the next section. If 30-70% students answer the questions correctly, the teacher will require students to discuss relevant concepts in groups and administer the same test again after their discussion. The necessity of more group conversations depends on students’ performance in the repeated test (Mazur, 1997). This practice is an innovation in classroom instruction, creating an active, cooperative teaching environment that encourages inter-student and teacher-student interaction (Zhang & Mazur, 2010).

Peer instruction, as an active learning strategy, has garnered wide attention in the education community. Michinov et al. (2015) argued that social constructivism theoretically underpins peer instruction, in which social interactions, taking the forms of in-class discussions and cooperation, play crucial roles in student knowledge construction. Research found that peer instruction, from the perspective of cognitive development, helps improve the conceptual understanding, problem solving performance, critical thinking, decision-making procedure, and scientific reasoning ability of the students while also in-

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creasing teacher-student interactions and enhancing students' concentration (Crouch & Mazur, 2001; Gok & Gok, 2017). It also contributes to bolstering student satisfaction with courses and attendance by enhancing their in-class emotional experience (Gok & Gok, 2017). Nevertheless, the peer instruction method is not without its limitations. According to Smith et al. (2011), not all students benefit from the peer instruction method; high-achieving students tend to gain more from it than those low-performing ones. A portion of students do not like peer instruction simply because of the fear of being embarrassed when making mistakes in peer interactions. Also, the teacher may encounter serious challenges in organizing in-class interactions and evaluating students' involvement when the class size is bigger than 50, or there is a lack of technological assistance (Gok & Gok, 2017).

Despite the potential difficulties with the application of peer instruction, the efforts to integrate it into classroom teaching are ongoing. Peer instruction was initially applied to college physics teaching and subsequently introduced to other disciplines such as medicine, nursing, biology, mathematics, and English, and to all education levels. In addition, researchers have also tried to combine peer instruction with other teaching models, such as the flipped classroom (Rowley & Green, 2015), to further optimize student academic gains. So far, however, peer instruction has been most heavily used in science education such as physics education (Henderson et al., 2012; Zheng et al., 2020), which indicates that this teaching method has extraordinary advantages in increasing instructional outcomes of science subjects.

Chemistry, a branch of natural science, involves many complex and abstract concepts (Coll, 2006) and is often rated as a challenging subject by students. Peer instruction has the potential to be productive in a chemistry classroom as it is an instructional strategy intended to facilitate students' grasp of scientific concepts. *Implementation of Peer Instruction Method on Teaching of Acids and Bases to 12th-Grade Students: An Action Research* in this issue is an investigation of the applicability and effectiveness of peer instruction in senior secondary chemistry education using both qualitative and quantitative data. Its research findings show that peer instruction improved the students' conceptual learning and was also efficacious in eliminating their misconceptions, and that student participants perceived it as a useful, effective learning method and developed more positive attitudes towards chemistry and in-class discussion after their implementation of this method (Ozcan et al., 2024). Given the limited research duration and small sample size of the study, it may not be appropriate to generalize its conclusions to other teaching settings. Yet, it could still serve as a valuable resource for teachers and education researchers who are exploring the effects of peer instruction as an active learning strategy.

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