

Table 2. Types of active learning that have been demonstrated to enhance learning.

Types of active learning with feedback	Examples of studies that demonstrate enhanced learning
Small group discussion and peer instruction	Anderson et al. (2005); Armbruster et al. (2009); Armstrong et al. (2007); Beichner et al. (1999); Born et al. (2002); Crouch and Mazur (2001); Fagen (2002); Lasry et al. (2008); Lewis and Lewis (2005); McDaniel (2007a, 2007b); Rivard and Straw (2000); Tessier (2004 and 2007); Tien et al. (2002)
Testing	Steele (2003)
One-minute papers	Almer et al. (1998); Chizmar and Ostrosky (1998); Rivard and Straw (2000)
Clickers	Smith et al. (2009, 2011)
Problem-based learning	Capon and Kuhn (2004); Preszler et al. (2007)
Case Studies	Preszler (2009)
Analytical challenge before lecture	Schwartz and Bransford (1998)
Group tests	Cortright et al. (2003); Klappa (2009)
Problem sets in groups	Cortright et al. (2005)
Concept mapping	Foncesca et al. (2004); Prezler (2004); Yarden et al. (2004)
Writing with peer review	Pelaez (2002)
Computer simulations and games	Harris et al. (2009); McDaniel et al. (2007); Traver et al. (2001)
Combination of active learning methods	Freeman et al. (2007); O'Sullivan and Cooper (2003)

Note: All studies cited compare treatment and control groups. Full references are found in Appendix I.

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