Chapter 8

STRATEGIC USE OF CONFLICTS
IN TUTORING SYSTEMS

Esma Aimeur
Université de Montréal, Québec, Canada
aimeur@IRO.UMontreal.CA

Abstract  Tutoring strategies have evolved from direct learning to cooperative learning involving various agents, which are either computer simulated or real human beings. During these learning sessions conflicts then arise since the student must interact with several simulated participants such as the tutor, the companion, or the troublemaker (a companion able to mislead the learner). We call these conflicts external conflicts. Some of them are accidental but others are intentional in order to test the learner’s self-confidence and to detect internal conflicts that oppose new knowledge to existing learner knowledge. In this chapter, we highlight the usefulness of conflicts in various cooperative learning strategies, showing that they contribute with social interaction to the development of cognition. In particular, we discuss the advantage of an intentional external conflict caused by a difference of opinion between the student and the troublemaker. This difference of opinion is introduced in order to get the student to evaluate his own opinion and cognitive schema. If the learner presents a cognitive dissonance (discord between ideas) a dialogue with the troublemaker will help him correct his internal conflicts. Then, the tutor and the troublemaker cooperate to manage a learning session. We present experimental results that show the gain brought by the troublemaker conflicts in learning improvement.

1. INTRODUCTION

Over the last few years, cooperative learning systems (Slavin, 1990a, Slavin, 1990b, Augustine et al., 1990, Schultz, 1990, Cumming, 1991) have been extensively studied in different domains both in terms of their design and in terms of their implementation. Since in such systems there is an interaction and a dialogue between several partners it is inevitable that conflicts would arise between them.
Researchers have asked many questions about these conflicts including: What to do in case of a conflict? Can one predict and avoid conflict? How does one resolve the conflict? Can conflict be quantified? It is however important to notice that conflicts can have negative but also positive impacts. In our opinion, although research has been done in the area of conflict resolution, not enough work has been done in taking benefit from the conflicts which arise (Aïmeur et al., 1997a).

In Intelligent Tutoring Systems (ITS) (Sleeman and Brown, 1982, Fras-son and Gauthier, 1990, Anderson et al., 1995), one can find different learning strategies among which are cooperative strategies. It is interesting to note that these strategies can cause different types of conflict (tutor/learner, learner/co-learner (Gilmore and Self, 1988), learner/companion (Chan and Baskin, 1990), learner/troublemaker (Aimeur and Frasson, 1996), etc.). This last one is strongly conflicting. We call these conflicts, external conflicts.

In this chapter we intend to consider, in the evolution of learning strategies, the role and importance of conflicts in the interaction between the learner and the other learners, or the tutor. In fact, various factors can play a role in the improvement of learning such as motivation, arousal, feedback, reinforcement, etc. We will focus on the learner/troublemaker conflict which is an intentional external conflict. It consists of a difference in opinion between the learner and the troublemaker (specialized tutor), and this difference is introduced to attain an obvious pedagogical goal: to make the learner evaluate his own opinion and cognitive schema. If learner is experiencing cognitive dissonance (discord between two ideas) (Festinger, 1989) then an argumentative dialogue with the troublemaker will help him correct conflicts with his own set of knowledge that we call internal conflicts. This discussion is organized according to a scenario set by the troublemaker (section 5).

In this chapter we first review the evolution of learning strategies towards co-operative environments that show the necessity of reciprocal interaction. These interactions can cause different types of conflicts that we present in section 3. In particular, we introduce the cognitive dissonance theory (Festinger, 1957) one of the best known and most researched frameworks pertaining to attitude change which is caused by conflicts among beliefs. We analyze in section 4 the different kinds of conflicts which exist in an ITS and especially for those that use cooperative learning strategies. We will show, in particular, how a new cooperative strategy that we have developed can correct the cognitive dissonance. We define in section 5 the notion of conflict management and the different forms of dialogues. In order to validate two hypotheses formulated on the utility of conflicts in cooperative learning improvement we present in section 6 experimental results concerning the comparison of two cooperative learning strategies.