

Motivational Intelligent Tutoring Systems

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Abstract: In broad terms intelligent educational systems, whether learner-focused or teacher-focused, deploy their intelligence to assist in the development of the learner's knowledge or skill and assume that the learner is motivated to learn. By contrast, motivationally intelligent systems are able to deploy resources and tactics dynamically to maintain or increase the student's desire to learn and her willingness to expend effort in so doing. This presentation explores theories of motivation as developed in the psychological and educational literatures, describes how such theories have been implemented in intelligent educational systems, and briefly reviews systems that have addressed different aspects of the concept. Motivation is presented as a multi-faceted concept that has three broad components: one concerned with knowledge, skill and metacognition; another concerned with feelings and self-efficacy; and the third concerned with social context. The design of motivationally intelligent systems is characterised in terms of (i) the data potentially available to the system for undertaking motivational and cognitive modelling and reasoning about those models; (ii) the nature of the models themselves and the reasoning mechanisms that operate on them; and (iii) the ways that the system can dynamically react back to the learner on the basis of that reasoning. Three categories of diagnostic input and feedback reactions are outlined, each with its associated meta-level: (i) the domain and metacognitive; (ii) the affective and the meta-affective; together with their physiological and meta-physiological; and (iii) the overall educational context and meta-context. Implemented theories of motivation range from complex models of emotion in the broad to simple "thermostat" models based on a small number of key variables. Finally brief descriptions are given of systems based on thermostat models developed by the author and his colleagues.