# Implementation of Artificial Intelligence in engineering teaching and learning

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**Abstract.** This paper is concerned with increasing the efficiency of teaching and learning in engineering by applying artificial intelligence (AI) techniques and technologies. An approach to realize the personalized intelligent tutorial system (ITS) is propose, which would be more oriented to the specifics of engineering teaching. The key-idea is to create a subsystem for generating personalized tasks to students in the form of a decision module based on binary and fuzzy logic rules. Intelligent tutoring systems are characterized by storing three types of knowledge base [1-3]: a) domain knowledge, b) learner knowledge, and c) pedagogical knowledge. It is these types of knowledge that also determine the three main parts of the ITS architecture: a) domain knowledge creation/development applications, learner knowledge assessment modules and pedagogical knowledge creation/development modules. The scheme of an ITS with the information flow in this system is proposed (see Fig. 1), in which the key component of the ITS is the intelligent generator of personalized tasks for each student. This module is a dedicated tool that generates recommended tasks for each student on what they need

to do next. The ITS recommends topics and learning resources based on previous long-term performance and the student's psychological profile. The

ITS must possess three main capabilities:

a) Estimates of the student's learning model; b) personalized tasks and recommendations for learning to be achieved; c) the ability to store, retrieve and modify a calendar that schedules both subjects and individual learning tasks.

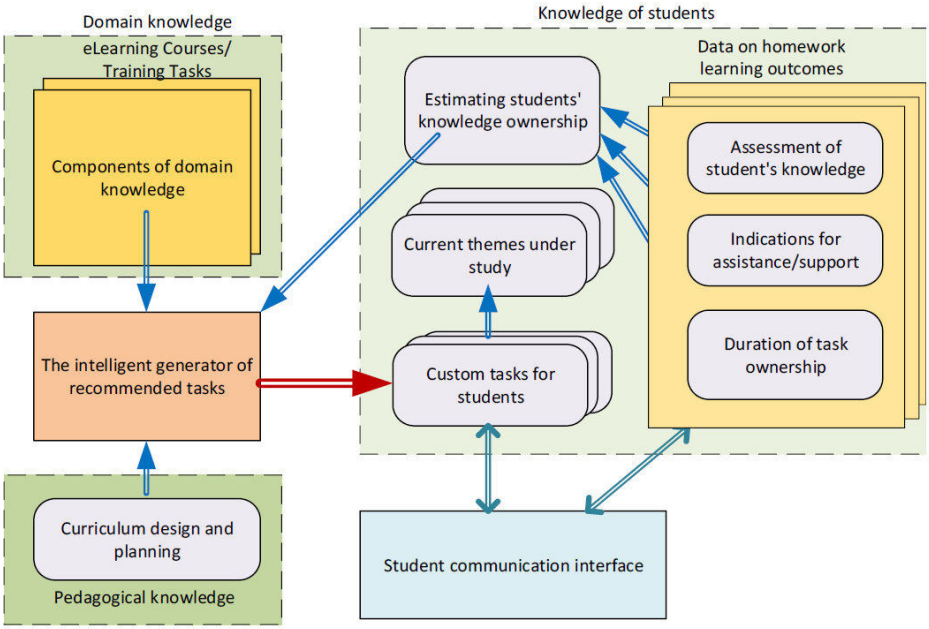


Figure 1. Data/information flow in the AI-based tutorial system.

These capabilities provide three ways in which a student can consider a learning task: a) the overview pane that lists all available tasks, b) the currently recommended resources; and c) the resource appropriation calendar. We propose that the task generator is realized as a decision system with a mixed rule base (with binary and fuzzy logic). As input information are the knowledge components of domain and the estimation of knowledge possession of each student. The output will be the list of personalized tasks for each student at a

concrete stage of the study process. The mode of forming individual tasks for students presents a heuristic algorithm managed by decision rules. These rules are created and dynamically developed/modified by the credentialed teachers for ITS development.

The proposed vision refers to the case of self-regulated study, (more typical for the engineering university environment), where tasks and recommendations have a more central role, helping students to go through the material efficiently but under their own control.

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