Rules Database

A. LEARNING SCENARIO RULES

I. Establishing whether a student is a hands-on learner
Overview: A Hands-on learner is one who finds it easiest to understand a subject by actually being given the opportunity to apply any of the material covered in the class. This is most different from book learning, whose proponents are most suited by studying the textbook material carefully without trying to apply that knowledge.

RELEVANT SUBGOALS: Tinkers?, Enjoys?, Skilled at hands-on tasks?, Thinks like a hands-on person?

Subgoal # 1: Tinkers?

1. *if* student tinkers
then student is a hands-on learner

2. *if* student has enjoyed playing with a lego/robotics set in the past
then student tinkers

3. *if* student has ever taken something apart to figure out how it works
then student tinkers

4. *if* student enjoys writing software programs ****** REUSE
then student tinkers

5. *if* student has ever entered a design competition for something
then student tinkers

6. *if* student entered actual experiments rather than subject overviews for science fair projects
then student tinkers

Subgoal # 2: Has a genuine interest in hands-on tasks?

1. *if* student has interest in hands-on things
then student is a hands-on learner

2. *if* student knows how household electricity or plumbing works
then student has interest in hands-on things

3. *if* student has voluntarily upgraded his desktop computer in the past
then student has interest in hands-on things

4. *if* student has modified or upgraded some part of his automobile before
then student has interest in hands-on things

5. *if* student enjoyed high school labs more than lectures
then student has interest in hands-on things

6. *if* student has tried to find out how common appliances like computers, TVs, and refrigerators work
then student has interest in hands-on things

7. *if* student enjoys "Popular Mechanics" more than "Scientific American" ****** REUSE
then student has interest in hands-on things

Subgoal # 3: Thinks like a hands-on person

1. *if* student thinks math class in HS was useless (excluding calculus)
then student thinks like a hands-on person

2. *if* student reads ahead to examples before completing a chapter in a textbook
then student thinks like a hands-on person

3. *if* student has ever contemplated the design breakdown of a complex piece of machinery or software
then student thinks like a hands-on person

4. *if* student would rather try things out by trial and error before looking at a manual or asking for help
then student thinks like a hands-on person

II. Establish whether the student is a book-based learner
Overview: A book-based learned learner learns best by internalizing the covered textbook/notes material as deeply as possible. Typically these type of learners are not as reliant on lectures or on seeing applications of the knowledge to learn.

Subgoal # 1: Classroom behaviors

1. *if* student crams for exams
then student has book-based learner-like classroom behavior

2. *if* student spaces out during lecture and is lost for the rest of the time
then student has book-based learner-like classroom behavior

3. *if* student uses textbook from past classes in current assignments
then student has book-based learner-like classroom behavior

4. *if* student skips many lectures
then student has book-based learner-like classroom behavior

Subgoal # 2: Thinks like a book learner

1. *if* student does not think high school math is useless
   then student thinks like a book-based learner

2. *if* student reads textbook chapter before consulting example problems
   then student thinks like a book-based learner

Miscellaneous for book-based learning

1. *if* student enjoys reading books in spare time
   then student is a book-based learner

2. *if* student reads manual before attempting to do something
   then student is a book-based learner

III. Establish whether the student is a lecturer-based learner

Miscellaneous:

1. *if* student takes notes and consults them during exam preparation or doing homework
   then student is a lecturer-based learner

2. *if* student considers classmates' opinions about lecturers in making course selections
   then student is a lecturer-based learner

3. *if* student usually asks questions or or interacts with lecturer outside of class
   then student is a lecturer-based learner

4. *if* student usually sits near the front of the class during lecture
   then student is a lecturer-based learner

III. Establish whether student is an independent learner
Overview: This type of student is able to motivate himself to learn about topics of interest, without a lot of hand-holding or supervision from the instructors. Typically, this type of person tries to go beyond the depth covered in class on his own, if the material appeals to him.

Subgoal # 1: Student is self-motivated

1. *if* student can keep up with a class which has few if any problem sets or assignments
   then student is self-motivated

2. *if* student tries to read about interesting class material outside of class, on his own
   then student is self-motivated

3. *if* student would not stop paying attention if a lecturer indicated material is not tested
   then student is self-motivated

IV. Establish whether the student is a discussion-based learner
Overview: A discussion-based learner is one who understands the material best after being given the opportunity to talk about it in a group, most often moderated by an instructor. This type of person is adept at teamwork and typically gets a better grasp on material after explaining things to others.

Subgoal # 1: Student works well in a team

1. *if* student prefers team projects over solo projects
then student is a team player

2. *if* student typically works in study groups to get things done
then student is a team player

3. *if* student learns best by explaining material to others
then student is a team player

Miscellaneous

1. *if* student usually attends lectures
then student is a discussion-based learner

2. *if* student asks questions of or interacts with lecturer outside of class
then student is a discussion-based learner

B. Preferred Discipline Rules
Overview: As mentioned in the paper, the approach used here is to establish first whether the student leans more towards EE or CS, and then to establish his preference in a subdiscipline of the one among those two that he ostensibly prefers.

I. Establishing preference for EE (roughly 6-1 and some parts of 6-2)
Overview: An "EE" person is one who is comfortable handling and building physical things. Typically, he would have an interest in electronic circuitry and try to understand how the pervasive electronic systems in their lives work.

Subgoal # 1: Establishing experience in EE

if student has taken things apart to find out how they work
then student has experience in EE

if student has enjoyed lego or robotics sets in the past
then student has experience in EE

Subgoal # 2: Establishing interest in EE

if student knows how household electricity works
then student has interest in EE

if student has ever tried to find out how common household appliances like TV or fridge work

then student has interest in EE

Miscellaneous:

if student enjoyed E&M unit of high school physics
then student prefers EE

II. Establishing preference of CS (roughly 6-3 and some parts of 6-2)
Overview: CS people typically have a very high degree of comfort with computers, much beyond the standard tasks most lay people engage in.

Subgoal # 1: Establishing interest in CS

if student enjoys trying out new computer programs occasionally
then student has interest in CS

if student periodically reads computer magazines like PC World
then student has interest in CS

if student has ever tried to understand how the internet works
then student has interest in CS

Subgoal # 2: Establishing comfort level with computers

if student has built his own website in the past
then student is comfortable with computers

if student writes software for his own use or enjoyment
then student is comfortable with computers

if student uses computer more things besides Web or e-mail
then student is comfortable with computers

Miscellaneous:

if student found HS math useful/enjoyable
then student prefers CS

Overview: These sections ask multiple choice questions of students, presenting them with representative choices picked from each of the three subdisciplines of EE or CS.

III. Establishing preference among CS subdisciplines (only asked if CS certainty is higher than EE certainty)

Three Multiple choice questions, with each choice having a rule augmenting the certainty of the predicate specified

Q1. Which of these is the most urgent problem?

A) Securing online transactions => prefers CS Theory
B) Making windows more crash-proof => Prefers Distributed Systems
C) Getting computers to understand natural language =>

Prefers Artificial Intelligence

Q2. Which of these projects sounds most interesting?

A) Finding computational problems that cannot be solved efficiently using modern computers => prefers Theory
B) Solving tough computer problems by leveraging idle CPUs of remote computers => prefers distributed systems
C) Creating a system to recognize and respond to facial expressions => prefers artificial intelligence

Q3. Which of these breakthroughs would you like to contribute to society?
A) An unbreakable computer security system => prefers cs theory
B) A way to substantially speed up current Internet traffic => prefers distributed systems
C) A robotic vacuum that adapts itself to every room, so as to cover every inch of space => prefers AI

IV. Establishing preference among EE subdisciplines (only asked if EE certainty is higher than CS certainty)

Two Multiple Choice Questions

Q1. Which of these sounds like the most interesting project?

A) Understanding the processing engine used in the original Nintendo Video Gaming System?
=> prefers Electronics
B) Finding a better compression scheme for video to allow w/o loss of quality (allowing faster download)
=> prefers Signals
C) Creating flexible, paper-thin LCD displays
=> prefers Device physics

Q2. Which of these would you consider the most significant and/or amazing invention?

A) Desktop PC w/ 30 parallel processors
=> prefers Electronics
B) Perfect computer voice recognition and comprehension by your desktop PC
=> prefers Signals
C) Creating computer chips out of completely organic materials
=> prefers Device physics