

Scientific Research Outlook & Technology Development in the Arab World
Damascus, 11-14 December 2006

E-LEARNING

Using Fuzzy Logic and
Virtual Reality Techniques

Dr. Kasim M. Al-Aubidy

Computer Eng. Dept.,
Philadelphia University, JORDAN

Objective

- Explains how interactive multimedia with virtual reality technology can be used to support and enhance the learning process through the internet.
- Describes how a fuzzy decision making process is used to update the learner model and specify his/her learning level to provide appropriate teaching materials to each learner.

Introduction

- The computer has recently become the most powerful tool in education. This is due to its speed, flexibility & ability to take a decision and display images. It can be used to process text, organize documents, and create a real physical representation.
- As the number of students entering the higher education increases along with the requirement for greater cost efficiency, the potential benefits of computer based learning and training are great.

Introduction

- Advances in computers, multimedia & communication technologies have changed traditional methods for education & skills training.
- ON-LINE learning means less travelling, lower cost and more efficient.

How the marriage of education & communication technology is going to evolve?

How we should prepare our institutes, students and instructors to deal with this technology?

Computer Aided Learning

- To obtain real-sense in learning & training, there is a need to explore more advanced technologies.



Virtual Reality

- Real educational processes deal with uncertainty in human knowledge. However, most of available educational systems use classical methods to handle vague information in the knowledge representation and decision making.



Fuzzy Set Theory

Multimedia Benefits

- It allows information to be displayed in different formats (text, graphs, animation, and video).
- The information delivery can be controlled either by the computer or by the learner.
- Multimedia has the potential to create a high-quality environment to support the education process.

Virtual Reality Technology

- Virtual reality is something, which is not real, but can be considered to be real while using it.
- Virtual reality provides an environment where multimedia tools can be used to create interactive interfaces and real-time response.
- Virtual reality can be used to evaluate how a user can achieve new experience in training without the support of physical environment.

Virtual Reality System Components

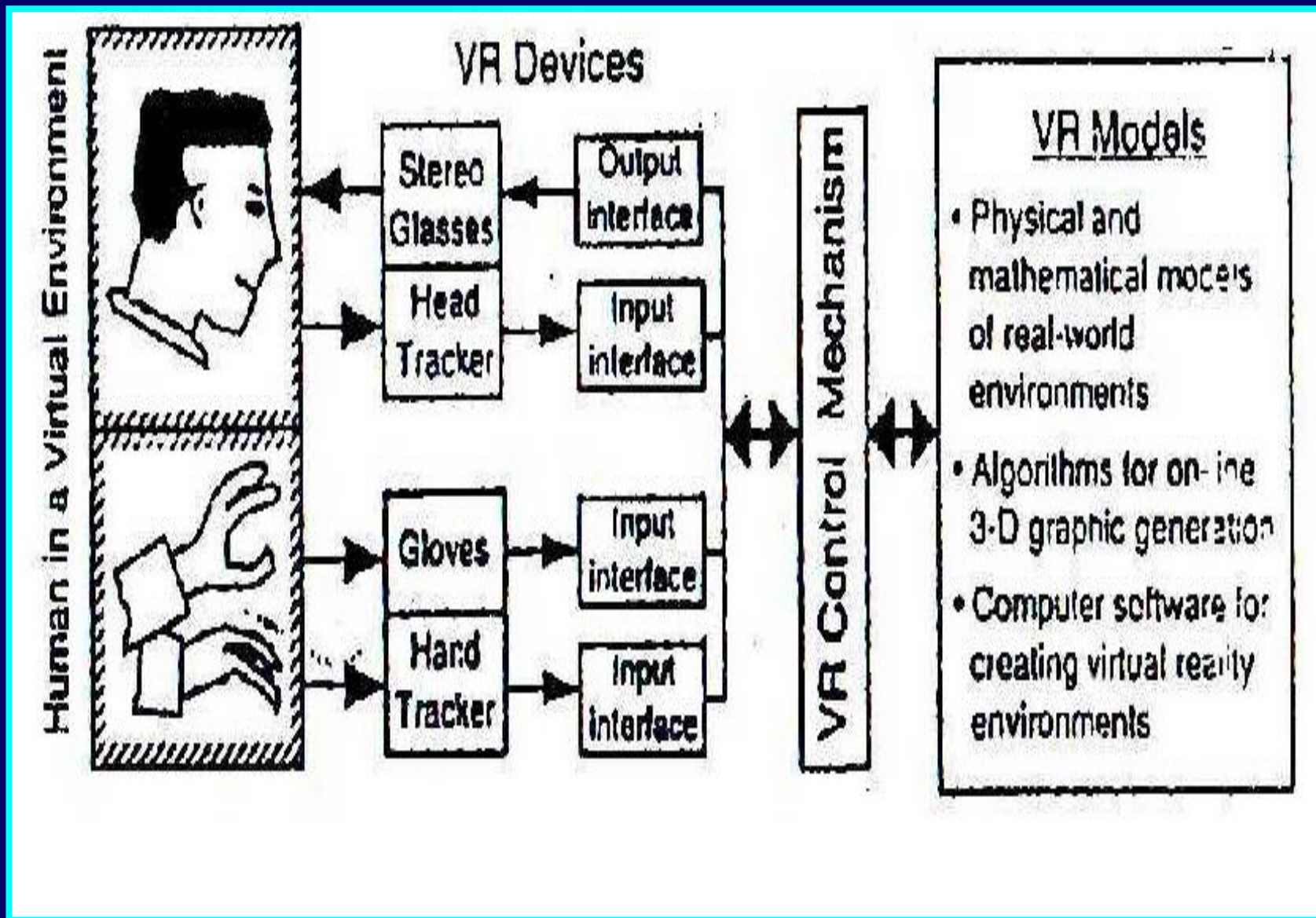
Hardware Requirements:

- Sensors and actuators,
- Head-coupled displays, and
- A personal computer with full multimedia facilities.

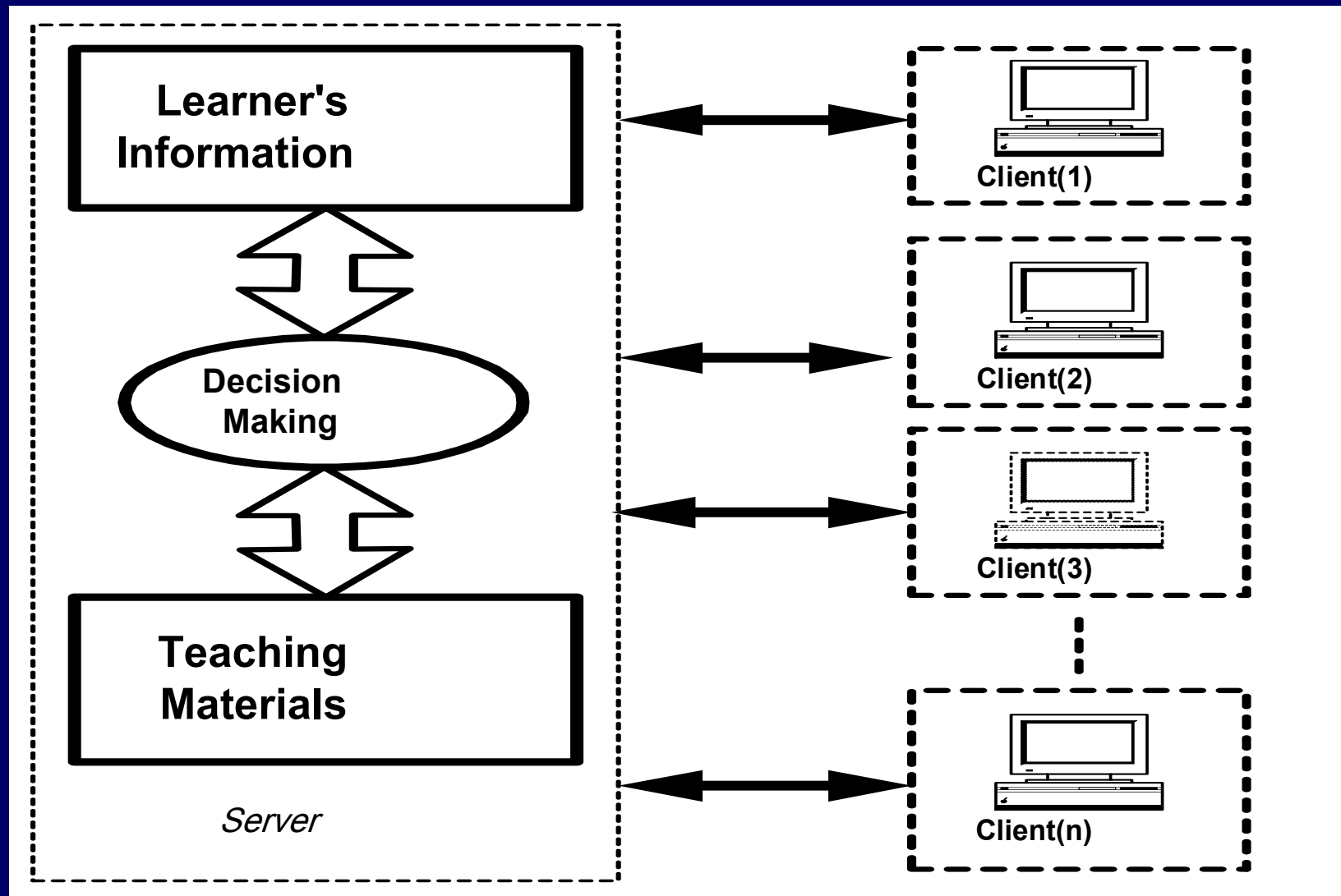
Software Requirements:

- **Modeling virtual worlds:** using AutoCAD, 3Dstudio,.....
- **Physical simulation:** computer animation systems,
- **Virtual reality toolkits:** software environment to support a wide range of applications.

Virtual Reality System Components



System Design Layout



Web Based Distance Learning - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address: 4Videos.com

Web-based Distance Learning

Course: Intelligent System Design (630452)

Learner Name	Ahmad Ali
Learner Level	A

- Overview
- Table of Contents
- Instructor
- Unit
- Abstract
- Normal
- Details
- Test
- Pause

Backward Chaining

Forward-chaining is a good inference technique if we are working with a problem that requires us to begin with information and then derive logical conclusions. In other problems, we begin with a hypothesis (goal) and attempt to prove it by gathering supporting information. This requires a goal-driven reasoning which is called backward chaining

Example

Consider the following set of rules:

R1: IF A AND C THEN E
R2: IF B AND C THEN E
R3: IF A AND D THEN C
R4: IF E THEN F

Assume the initial content of the database is

(A D)

Test Time: 00:00 < > EXIT Help? Search

Done

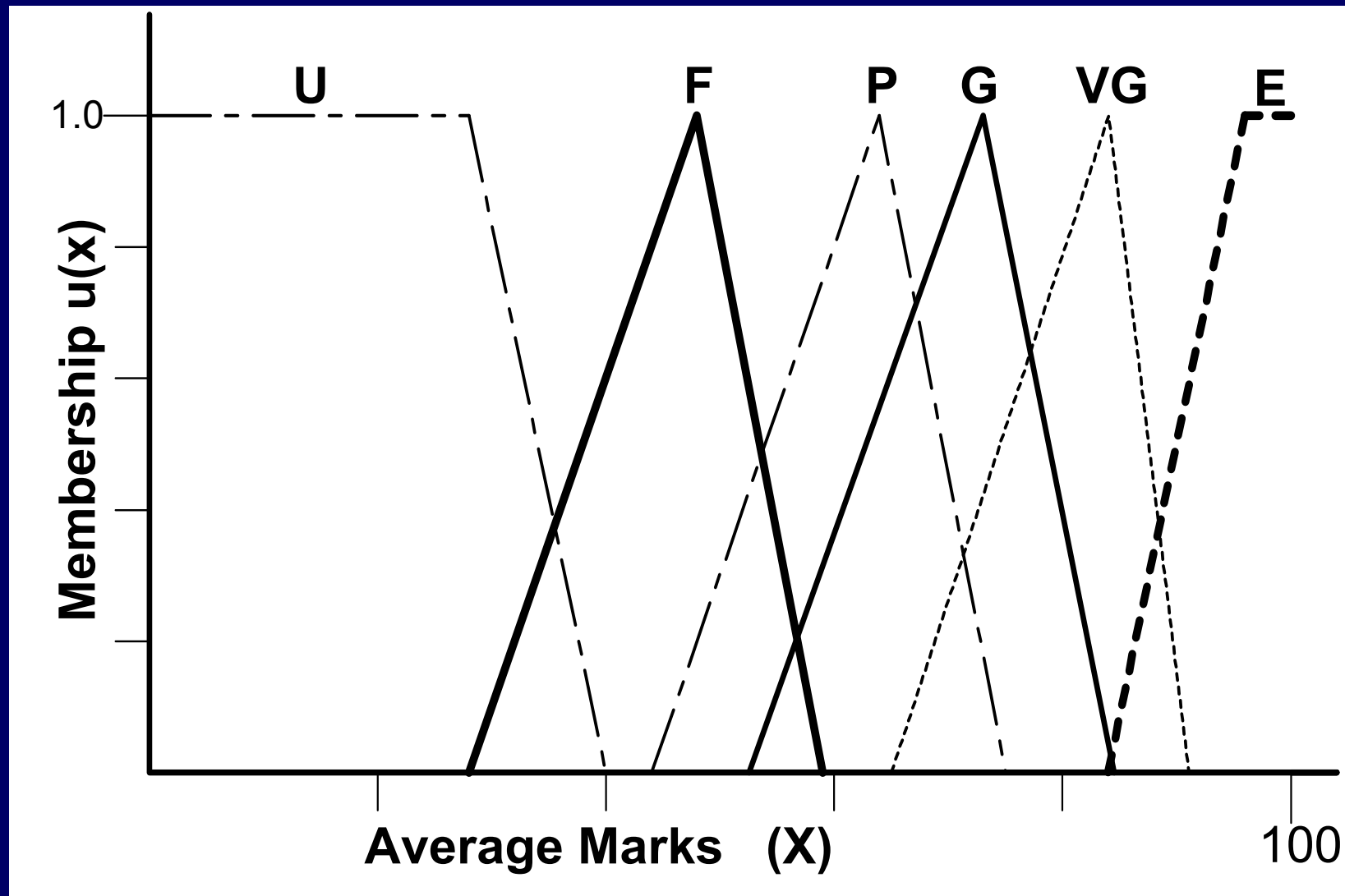
Start 35 floppy (A:) Web Based Distance Jasc Paint Shop Pro My Computer 3:30 AM

Fuzzy Set Theory and VR Systems

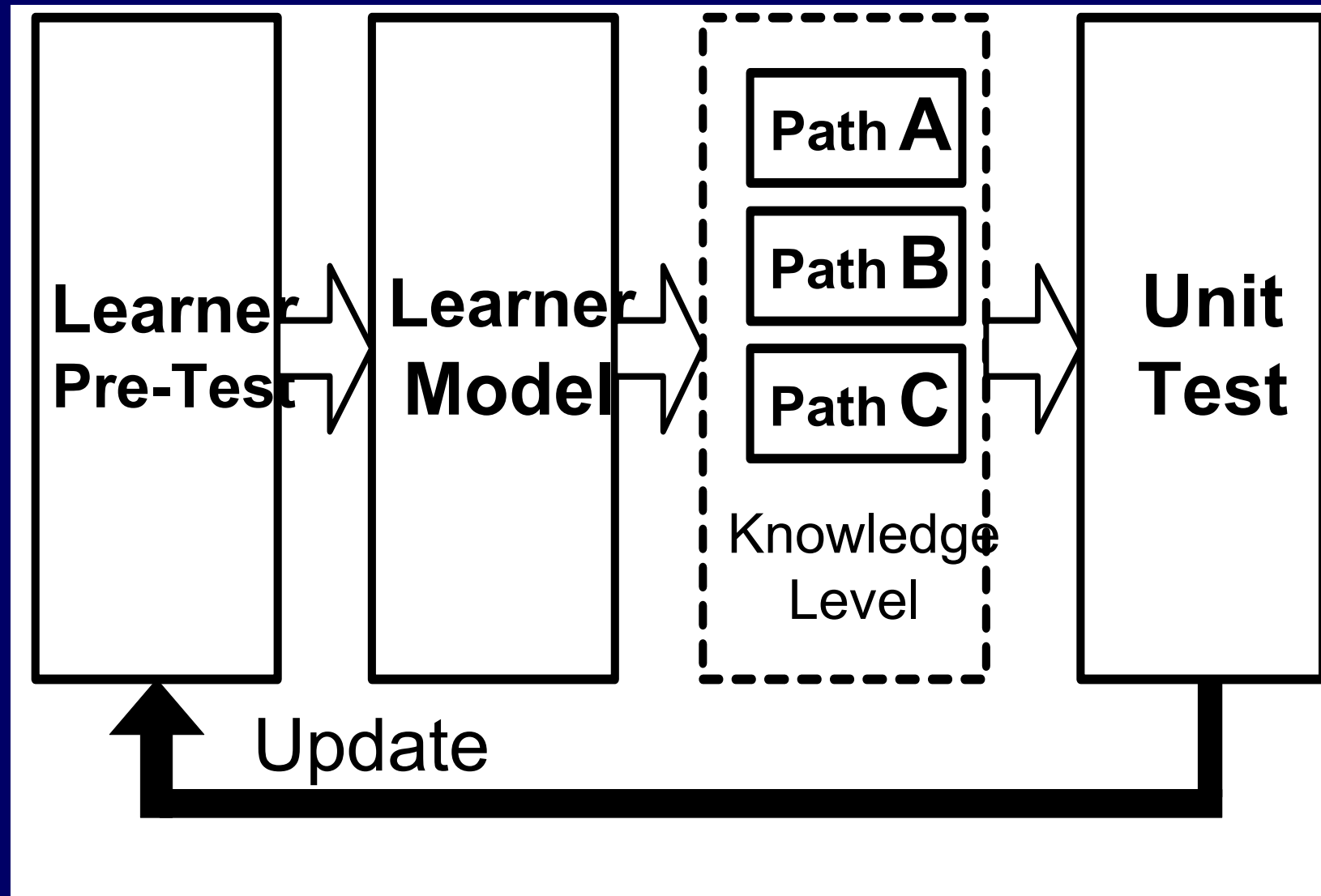
The source of these vagueness may be:

- Information provided by the learner.
- The current knowledge level of the learner.
- The evaluation of the learner level.
- The experience of the instructor.
- The objective behind the course materials

The fuzzy notation of "test result"

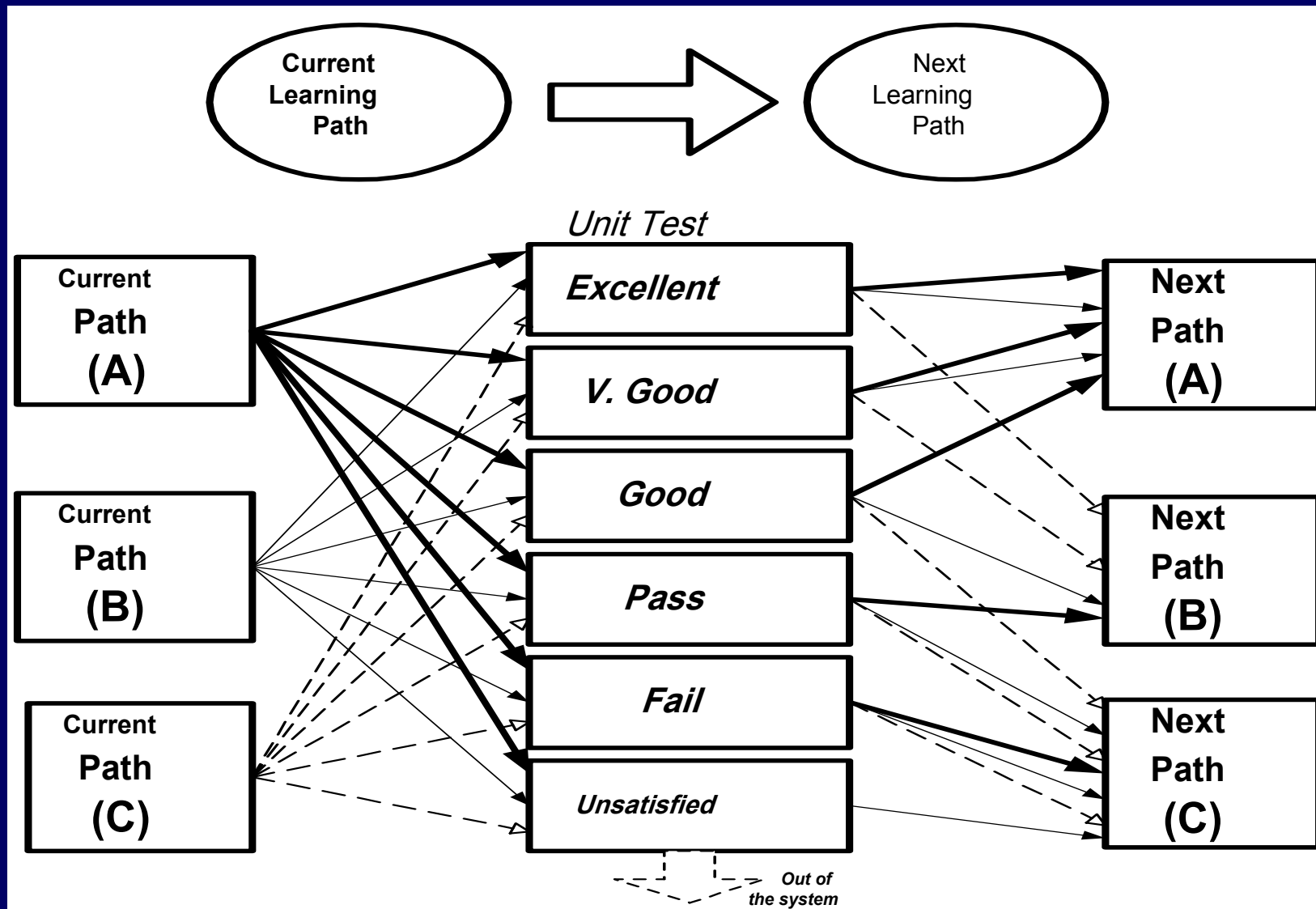


Proposed E-Learning System.



Rules for fuzzy decision making

	CLA	CLB	CLC
TE	NLA	NLA	NLB
TVG	NLA	NLA	NLB
TG	NLA	NLB	NLA
TP	NLB	NLC	NLC
TF	NLB	NLC	NLC
TU	NLC	NLC	OUT



Conclusions

- Future trends in learning and training will use virtual reality based education laboratories to support every type of education program.
- Data from scientific papers indicated that reactions to instruction delivered via internet were very positive.
- This demonstration explained the main issues for internet-based learning, which can be summarized as:

1. The design of instruction system(multimedia, virtual reality, internet facilities).
2. The course content to be delivered.
3. The measurement of student progress.
4. Training to people who are providing services to the enrolled students.