

THE VIRTUAL TUTOR

Development of a Virtual Tutor within a Simulated Working Environment

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Abstract: A simulation engine will be presented through which interactive virtual vocational environments were realized. In this simulation students could act as employees in a simulated company and as such gain experience and skills for their future profession. The simulations that are based on this simulation engine are simulations of practical situations that are being used in the secondary vocational education in the department of economics in the Netherlands. For the past six years this system has been totally redesigned and adapted to meet the requirements of the educational field. Now, thousands of users will be able to use this new simulation environment through the internet. At this moment an intelligent tutoring system is developed and will be tested. The simulation environment becomes now a full adaptive learning environment. During the workshop a demonstration will be given, showing the different possibilities of the system. Also the problems of filling the rules, decisions and content of the intelligent tutoring system will be discussed.

1 INTRODUCTION

To prepare the students in the Dutch vocational education system better on the real working situation, the former BIT Foundation¹ developed simulation environments for training practice in a simulated workplace for economic and administrative training.

In these environments the students could make themselves familiar with a real workplace. Classrooms were transformed to business places with all the real stuff and tasks.

Because it was very difficult to create a continuous stream of communication with the outer world, the BIT Foundation started working together with Peter Pel in 1996 who developed a special computer system, the simulation engine.

This simulation engine creates a virtual dynamic interactive working environment, wherein the communication with and feedback from the outer world happens in a natural way, triggered by the actions of the student.

¹ Now divided and merged into the SPL Foundation and the Engine Foundation.

2 PRIME CHARACTERISTICS

- Each student has his own 'workplace' in a professional environment. There he or she plays the role of an employee. That means that the students have to behave themselves as if they are working in a real company with all the rules and agreements that belong to that company.
- The simulation environment gives possibilities for the training of skills, competence and attitude to work, all in a relative safe situation.
- In some of the environments the students will work independently, in other environments they work as a team. But in all cases they have the experience that their actions do influence the work of other (virtual) people and that the most work is a reaction to the actions of others.
- The simulation environment consists of a lot of more or less complex problem solving situations which influence each other.
- A complete learning process will be offered by creating sessions that are build on scenarios that start simple and increase in complexity.
- Besides of the learning aspect there is also a 'fun' aspect.

3 EDUCATIONAL PHILOSOPHY

There are 7 educational principles that form the foundation for the simulation engine:

- People are interested in, driven and guided by real life, so therefore you must create a learning environment that is similar to real life.
- Every learning starts with a problem situation. If we can't bring the student in a problem situation, there will be no base motivation for learning something. Therefore, we have to create a learning environment with a great variety of situations that need problem solving.
- For the learner it has to be his personal problem. Nobody is inclined to solve the problems of others. Therefore, we have to create a situation where the student can identify him/herself with the problem situation.
- In real life problems will never come on their own. Most of our life can be typed as a multi problem situation. Simple problems can be very difficult when they are part of a more complex situation. Often we will solve simple problems in a completely different way because we are also solving other problems. Therefore we have to create a real life situation with a whole range of problems.
- Problems only exist in a social context. If we are just alone in this world there is no need to solve anything! Thus, we must bring the learning situation back to the basic social level.
- Faults don't exist in real life. If you do something you always have the idea that you do the right thing. Nobody plans to do things wrong. Only after we have learned that the outcomes are not what we expected, we realize that we have to act in another way next time. Besides that, mostly the social environment judges about the outcomes of your acting, and often there isn't one right outcome for everyone. For a good learning outcome the students need feedback in the way and at the moment it should come in real life.
- Often students in vocational education lost their interest in learning in a theoretical way. Therefore we have to give learning more 'fun'.

4 THE CLASSROOM AS PROFESSIONAL WORKING ENVIRONMENT

By bringing in the virtual simulation engine in the former working environments build by the BIT Foundation, it became possible to control the dynamics and the communication with the outer world. It also gave the opportunity to evaluate the actions of the students in a real life way.

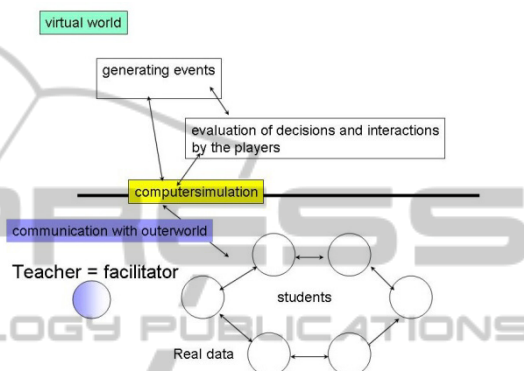


Figure 1: The classroom as working place.

5 THE STRUCTURE OF THE SIMULATION ENGINE

The simulation package consists of a content free modular program engine and a database system which drives the program.

With a library of many different objects it is possible to create any wished simulation environment.

There are objects for creating the navigation environment: i.e. rooms, corridors, objects for filling the rooms with furniture and technical equipment: bookcases, cupboards, objects for communicating with the outer world: telephones, mobiles, fax machines, objects for transportation and navigation and all kind of simulated applications on a simulated computer.

All these objects can interact with the central part of the engine that generates events and can receive the interactions with the objects by the student.

The way the objects are presented in the user interface for the student is specified by independent environment files.

The most important part of the engine is the set of scenario files which can be seen as the 'musical

score' wherein the basic elements are defined for the behaviour of the simulation environment.

It is not the software that drives the database, but the database that drives the software.

6 THE DYNAMICS OF THE EVENTS

The basic principle behind the simulation events is the next scheme that is based on the interaction between a sender and a receiver (the student). Like in real life when a person sends a letter (or any other kind of message) to another person, the sender decides what he will do when he gets his desired answer or what he will do when he doesn't get an answer.

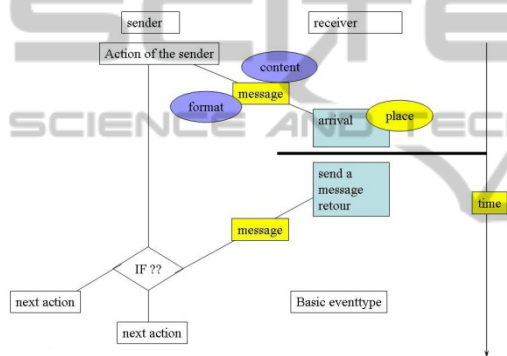


Figure 2: The basic event type.

On the other side, the receiver will receive the message at some moment. When it is a letter, it's delivery will take a day or longer, when it is an email it will come in when he starts the computer, when it is a phone call, it comes to him directly. But he decides when and how he will answer. In reality his answer can take too long and come to the sender after the sender did another action.

After bringing in an third party, where the student acts only as the person who gives the message to another virtual receiver (like the situation where the student acts as employee who divides the incoming post for other colleagues), it was possible to create variants on the basic event type based on: who is communicating with who, who is the waiting party, who has to remember what, etc.

After that, scenarios could be made by making chains of the different basic event types.

A simulation session starts with a combination of many different scenarios which play their in a multitasking way. During initialisation of the simulation session all the scenario definitions will be

filled in with different data based on certain parameters. In fact, after the first second all virtual participants will live their own life based upon their private and unique scenarios and dependent of the interaction with the student. The student will experience this situation as complex as real life.

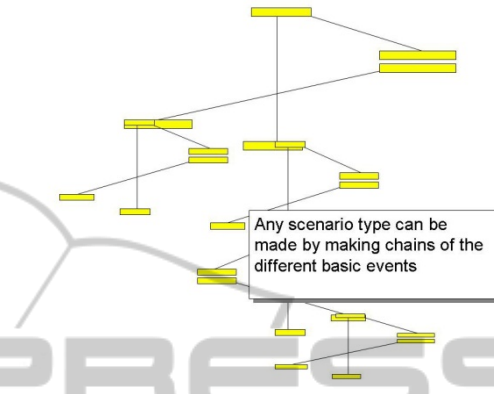


Figure 3: Chain of events.

Based on the described principles and simulation engine, the BIT Foundation and nowadays SPL build a lot of simulation environments for different vocational training situations, like:

- bookkeeping, business-administration
- secretary
- banking, finance, insurance
- logistics, retail, wholesale trade
- IT
- vocational orientation

7 THE THIRD GENERATION ENGINE

Over the last six years the whole simulation engine has been rebuild. At this moment the new system is implemented on one central server cluster where about 10.000 students log in by internet and play their simulation simultaneously. Teachers can see the results on one place and can follow the actions of the students. Developers are working together on servers specific for development and fine tuning of the simulations.

The system is more consequently divided in three parts:

The **database** filled with

- All the details of persons, companies, articles, etc
- All the events and scenarios for the different simulated environments

