Chapter 2
Simulation Environments as Vocational and Training Tools

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ABSTRACT

This paper investigates over 50 simulation packages and simulators used in vocational and course training in many fields. Accordingly, the 50 simulation packages were categorized in the following fields: Pilot Training, Chemistry, Physics, Mathematics, Environment and ecological systems, Cosmology and astrophysics, Medicine and Surgery training, Cosmetic surgery, Engineering – Civil engineering, architecture, interior design, Computer and communication networks, Stock Market Analysis, Financial Models and Marketing, Military Training and Virtual Reality. The incentive for using simulation environments as vocational and training tools is to save live, money and effort.

INTRODUCTION

Computer Simulation is widely used as an educational, as well as training tool in diverse fields; *inter alia* pilot training, chemistry, physics, mathematics, ecology, cosmology, medicine, engineering, marketing, business, computer communications networks, financial analysis etc., whereby computer simulation is used to train and teach students in many fields, not only to save: time, effort, lives, and money, but also to give them confidence in the matter at hand, in view that using computer simulation delivers the idea with sight and sound.

Banks in 2000 summarized the incentives why we need simulation in the following reasons: Making correct choices, Compressing and expanding time, Understanding "Why?", Exploring possibilities, Diagnosing problems, Developing understanding, Visualizing the plan, Building consensus, Preparing for change. The reader can refer to (Banks, 2000) for more detailed study.

Moreover, computer simulation is considered a knowledge channel that transfers knowledge from an expert to newbie, thereby, training a pilot or a surgeon while using computer simulation, is in fact empowering the trainee with the knowledge of many expert pilots and expert surgeons. Accordingly, the

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Figure 1. Simulation Applications in Educations and Training

paper shall discuss the simulation environments and packages used to train and teach in the following fields, as it is stipulated in (Figure 1):

1. Pilot Training.
2. Chemistry.
3. Physics.
4. Mathematics.
5. Environment and ecological systems.
6. Cosmology and astrophysics.
7. Medicine & Surgery training.
8. Cosmetic surgery.
9. Engineering – Civil engineering, architecture, interior design.
10. Computer and communication networks.
11. Stock market analysis, Financial Models, and Marketing.
12. Military Training and virtual reality.

In Pilot Training the paper discusses flight-safety, *Frasca*, *HAVELSAN*, and Thales. In Chemistry the simulators: Virtlab, REACTOR, ChemViz, ChemLab, NAMD and VMD are discussed. In regards to physics training Physics Simulator, PhET, Fission, RadSrc and CRY, ODE, Simbad, and TeamBots simulation packages will be discussed. In teaching mathematics by using simulation Matlab and STELLA are discussed in addition to statistical software like Fathom, DataDesk and Excel.

Environment and Ecological Systems, the paper will discuss SEASAM, The Agricultural Production Systems Simulator (APSIM), and Ecosim Pro simulation packages. In addition,