Chapter 8.3
Evaluation of an Open Learning Environment[1]

Geraldine Clarebout
University of Leuven, Belgium

Jan Elen
University of Leuven, Belgium

Joost Lowyck
University of Leuven, Belgium

Jef Van den Enden
Institute of Tropical Medicine, Belgium

Erwin Van den Ende[2]
Institute of Tropical Medicine, Belgium

INTRODUCTION

Educational goals have generally shifted from knowing everything in a specific domain to knowing how to deal with complex problems. Reasoning and information processing skills have become more important than the sheer amount of information memorized. In medical education, the same evolution occurred. Diagnostic reasoning processes get more strongly emphasized. Whereas previously knowing all symptoms and diseases was stressed, reasoning skills have become educationally more important. They must enable professionals to distinguish between differential diagnoses and recognize patterns of illnesses (e.g., Myers & Dorsey, 1994).

BACKGROUND

Authentic or realistic tasks have been advocated to foster the acquisition of complex problem-solving processes (Jacobson & Spiro, 1995; Jonassen, 1997). In medical education, this has led to the use of expert systems in education. Such systems were initially developed to assist practitioners in their practice (NEOMYCIN, in Cromie, 1988; PATHMASTER in Frohlich, Miller, & Morrow,

1990; LIED in Console, Molino, Ripa di Meanan, & Torasso, 1992). These systems simulate a real situation and were expected to provoke or develop students' diagnostic reasoning processes. However, the implementation of such expert systems in regular educational settings has not been successful. Instead of developing reasoning processes, these systems assume them to be available. They focus on quickly getting to a solution rather than reflecting on possible alternatives. Consequently, it was concluded that students need more guidance in the development of diagnostic reasoning skills (Console et al., 1992, Cromie, 1988; Friedman, France, & Drossman, 1991); instructional support was lacking.

KABISA is one of the computer programs that, among other things, aims at helping students to develop their diagnostic reasoning skills (Van den Ende, Blot, Kestens, Van Gompel, & Van den Enden, 1997). It is a dedicated computer-based training program for acquiring diagnostic reasoning skills in tropical medicine.

DESCRIPTION OF THE PROGRAM

KABISA confronts the user with cases or "virtual patients". The virtual patient is initially presented by three "characteristics"[3], randomly selected by the computer. After the presentation of the patient (three characteristics), students can ask additional characteristics gathered through anamnesis, physical examination, laboratory and imaging.

If students click on a particular characteristic, such as a physical examination test, they receive feedback. Students are informed about the presence of a certain symptom, or whether a test is positive or negative. If students ask a "non-considered" characteristic, that is, a characteristic that is not relevant or useful in relation to the virtual patient, they are informed about this and asked whether they want to reveal the diagnosis they were thinking about. When they do so, students receive an overview of the characteristics that were explained by their selection and which ones are not. Additionally, they get the place of the selected diagnosis on a list that ranks diagnoses according to their probability given the characteristics at hand. If students do not want to show the diagnosis they were thinking about, they can just continue asking characteristics.

A session is ended with students giving a final diagnosis. KABISA informs them about the correctness. If it is correct, students are congratulated. If the diagnosis is not correct, students may be either informed that it is a very plausible diagnosis but that they do not have enough evidence, or they may get a ranking of their diagnosis and an overview of the disease characteristics that can and cannot be explained by their answer.

Additionally, different non-embedded support devices, that is, tools, are made available to support learners. These tools allow students to look for information about certain symptoms or diseases, to compare different diagnoses, or to see how much a certain characteristic contributes to the certainty for a specific diagnosis. Students decide themselves when and how they use these devices (for a more detailed description, see Clarebout, Elen, Lowyck, Van den Ende, & Van den Enden, 2004).

FUTURE TRENDS

In this section, some critical issues are put forward that raise discussion points for the future design and development of open learning environments.

A Learning Environment vs. a Performance Environment

KABISA is designed as an open learning environment, that is, students are confronted with a realistic and authentic problem; there is a large amount of learner control and tools are provided