

A POST- GRADUATE ONLINE INSTRUCTION SYSTEM ON PORT LOGISTICS USING PROBLEM-SOLVING TECHNIQUES

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Abstract

In this article we present a prototype online course on Port logistics destined to post graduate students in industrial engineering and maritime transport schools. The course uses problem-solving techniques to motivate the adult learner. The first step to realize the learning objectives is to make the student virtually live a problem in a real setting. In a very challenging way, he is required to solve the problem to proceed throughout the curriculum. Exercises are developed in an interactive way using computer-aided learning in a fashion similar to computer games where players proceed through different levels of difficulty. The pedagogy based on problem solving is employed to ensure that learning has been achieved. Freeware is used for programming. Technological prerequisites include a moderate speed internet connection and a computer providing a good quality display for graphics and video. The feasibility of integrating this course to one of the post-graduate degrees programs in Alexandria University, Egypt has been tested and evaluated in light of regulations concerning teaching methods

and exams directives of the Ministry of higher Education in Egypt. Obstacles and facilitating elements are discussed as well as targeted quality standards.

Key words: port logistics, port management, container terminal logistics, container terminal management, online courses, distance learning, computer-aided learning, problem-solving

A post-graduate online instruction system on port logistics using problem-solving techniques

In this article we present a prototype online course on Port logistics destined to post graduate students in industrial engineering and maritime transport schools. The course uses problem-solving techniques to motivate the adult learner. The first step to realize the learning objectives is to make the student virtually live a problem in a real setting. In a very challenging way, he is required to solve the problem to proceed throughout the curriculum. Exercises are developed in an interactive way using computer-aided learning in a fashion similar to computer games where players proceed through different levels of difficulty. The pedagogy based on problem solving is employed to ensure that learning has been achieved. Freeware is used for programming. Technological prerequisites include a moderate speed internet connection and a computer providing a good quality display for graphics and video. The feasibility of integrating this course to one of the post-graduate degrees programs in Alexandria University, Egypt has been tested and evaluated in light of regulations concerning teaching methods and exams directives of the Ministry of higher Education in Egypt. Obstacles and facilitating elements are discussed as well as targeted quality standards.

I. Introduction

The fast growth of the Internet has allowed more media to offer educational products. Besides, the modern busy life of young graduates has made the attendance of a postgraduate course after working hours a real nightmare. Postgraduate students seek a postgraduate degree for two main reasons: refreshing and adding to their knowledge, and

improving their selling ability in the labor market. Whether the motive is the first or the second, the postgraduate student is generally serious and motivated to study his course and to continue what he has started. However, two problems appear. In addition to the long working days of the new graduates that do not make evening courses appealing, the student is rewarded according to some criteria that do not really reflect his level of assimilation. Unfortunately two many exercises are still designed in a way that mostly checks the student ability to study some information by heart or to provide long texts that may be irrelevant but very welcome though. To present a remedy to the problem, learning through problem solving techniques has been proposed by several authors. Merits and problems of problem-based learning are discussed by Boukleif and Adib ().

According to John Dewey (1859-1952), the famous educational psychologist, thinking is initiated when a person perceives a problem and then tries to clarify the exact nature thereof in order to determine possible solutions. Understanding of the problem is thus first sought through the use of prior knowledge. Then, hypotheses are stated with a view to testing them through some active experimentation. Learning has occurred if the problem is solved. And it is only when learning has occurred that a permanent behavioral or performance change can be induced. So, these ideas are not really new but unfortunately were untaken care of in many educational institutions.

On the other hand, interactivity and problem solving techniques used for entertainment reasons in computer games for children and

adults result in inducing a permanent performance or behavioral change even on the reflexive side without yet intending to do so and without including any learning content. So now we have a double challenge, introducing the interactivity and in an electronic setting for all the reasons we advanced. In addition, postgraduate courses involve other critical issues such as motivating the adult learner and dealing with learning styles that become more and more individual when people mature.

Programming solutions using simple software were proposed in the context of distant learning by many researchers. Martinez-Nistal et al (1994) developed an interactive course on Digital Image Processing. Since then lots of engineering courses has been interactively designed using innovative learning means such as interactive games (Philpot et al., 2003). Naghdy and Chen (2000) developed an intelligent laboratory instruction system and McBride and Winchester (2003) designed an engineering economy course. In this article, we exploit the features of some freeware to present an easy to maintain, inexpensive to procure on-line learning tool. The course is destined to postgraduate industrial engineering students. To our knowledge, port logistics courses are not yet available for distance learning purposes. We highlight our contribution on the level of the exercises design that present a lot of innovation, especially to the student population in Egypt. Section two presents the scope of the course, section three discusses the exercises used for evaluative reasons, section four examines the implementation experience and we conclude and highlight avenues for future research in section five.

II. Scope of the course

The developed course is entitled Port logistics and is offered to students studying to obtain a higher diploma, a masters or a Ph.D. degree in Industrial engineering. Ports feature a lot of

typical industrial engineering problems; namely, material handling within the ports (container handling), staffing and de-staffing of containers, loading and unloading vessels and scheduling vessels to berths. This involves a lot of distance and space optimization methods, techniques and solutions that the course presents. Having attended an operational research course is a prerequisite to register for the course.

The course contains very diverse and complete material to cover many settings and environments. It provides links to additional complementary aspects and information. The course material is available in both English and French languages.

The course is designed in such a way to make the participant feel the port's environment so as to facilitate the understanding of real problems. So if a student is not familiar with ports, an introductory chapter presenting the port scenario supported by real photos and illustrations reproduces the environment and makes the student more and more familiar with these settings.

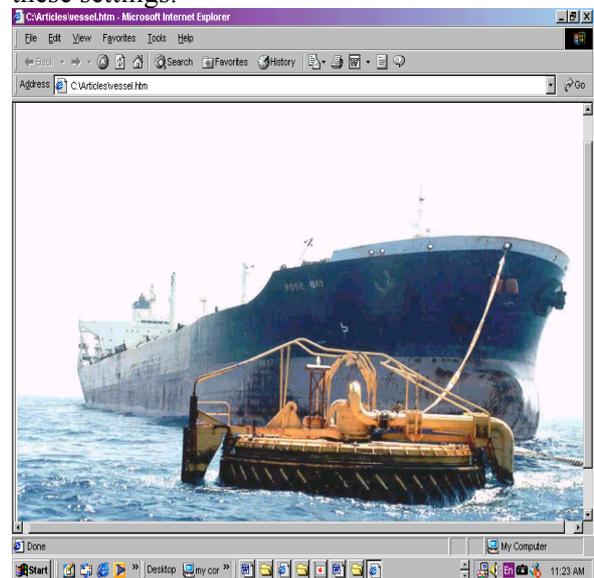


Figure 1. Example of a picture familiarizing with the maritime context

The course also includes four more chapters namely, handling of bulk material, discrete material handling, loading and unloading equipment for bulk material and information systems and containers tracking.

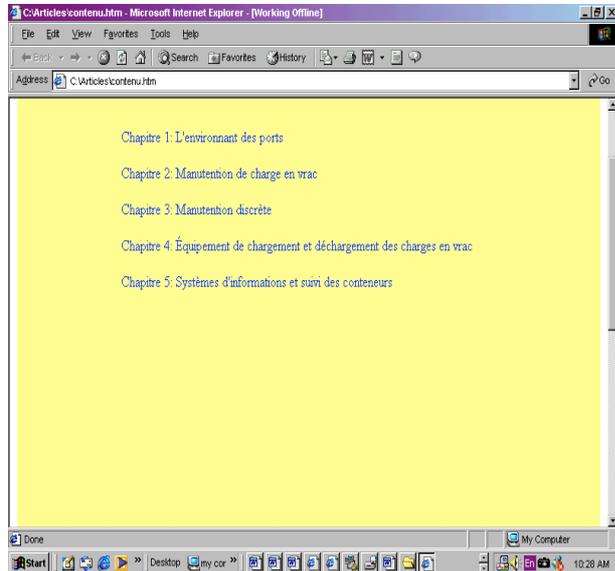


Figure 2. Interface showing the course content in French language

III. Exercises

Exercises are generally interactive. Interactivity includes making some information available for some time online, providing hints and alerts to prevent proceeding in a wrong way and the possibility of permitting some exchange among students. The instructor or the tutor is available online for some periods to answer the students questions and to clarify ambiguities.

Different types of exercises are designed for this course. A problem-solving approach is used in designing the exercises. The amusement and entertainment side in studying is also taken care of in the designing of the exercises. The following examples are included in the different chapters:

III.I. Crossword puzzles

Crossword puzzles are used with exercises that require the proof of mastering some terminology. The example presented in this paper is the example of an ordinary cargo derrick (Chapter 2) where the different parts are designated by a different name. Specific terminology requires a high degree of precision otherwise it might be confusing when communicating some information. Crossword puzzles provide some challenge when it comes to recall information that has been studied by heart or where no apparent logical link exists between the term and the part.

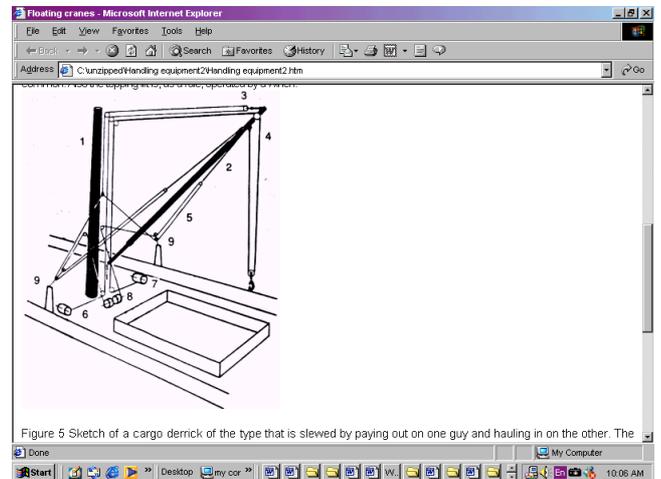


Figure 3. The derrick sketch used with the crossword puzzle

III.II. Building exercises

Building exercises are those exercises that require the verification of mastering a body of knowledge before engaging the student in an exercise that may be misleading and time consuming. This approach might appear simplistic but it suits the graduate student nature. In many cases graduate exams are open book or take home exam. In their professional life, students also have the necessary tools and documentation available, so this building

technique is judged encouraging and beneficial. An example given in this article is in chapter three, where one *brick* in building the *wall* consists of providing a formula to calculate some value or providing some standard or design for pallets. Once the entered formula or design is correct, the student is invited to use it to calculate some value for a specific example. A following step would be offering some scenarios or solutions respecting this calculated value. Another exercise using the building bricks is verifying some modeling and formulation basics and then proceeding to modeling a specific scenario in order to solve the problem with some operations research techniques.

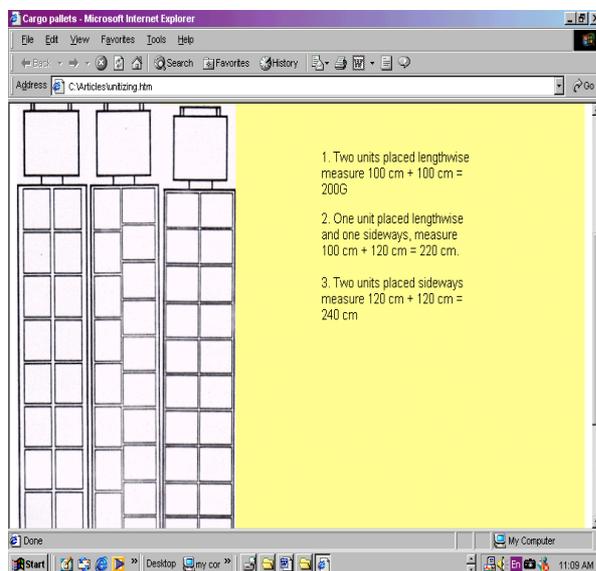


Figure 4. Information used with building exercises requiring a solution to road vehicle loading problem

III.III. Filling in the spaces

Whatever the chances of data availability and accessibility, the ability of recalling some information especially concerning important standards and regulations is very important to professionals. To make the most of this to the postgraduate student, filling in the spaces

exercise is designed in such a manner that the sentences rhyme together. This artistic touch offers a motivator to the adult learner and helps him recall the information in the future.

III.IV. Other exercises

Other conventional exercises are included in the course and are used when the students are required to provide some discussions. So students are asked to submit a text in an answer to a certain question. Multiple-choice questions are also used in some exercises. They are especially interesting in cases where students are confused and mix up between some answers. Even when the student does not succeed the exercise, the learning objectives are achieved. Generally students are no more confused when they lose marks because of picking the wrong answer. The right answer gets engraved in their minds. The diversity of the offered exercises allows better chance for the students to be fairly evaluated.

IV. Implementation

Freeware web-expert and Hot-potatoes are used for programming. Technological prerequisites include a moderate speed internet connection and a computer providing a good quality display for graphics and video. The professor or the tutor updates the site with needed information, provides some answers and clarifies ambiguities for students. Fixed time slots are predetermined to provide answers for some exercises or to communicate with the tutor or the professor.

Identifiers recommended by Uden and Campion (2000) are used to provide the utmost clarity of the course content and to allow clearer understanding and better representation. So all possible forms of information whether audio, video, graphical or text are provided if relevant with a certain part of the course.

The feasibility of integrating this course to one of the post-graduate degrees programs in Alexandria University, Egypt has been tested and evaluated in light of regulations concerning teaching methods and exams directives of the Ministry of higher Education in Egypt. The tests undergone by the course designers prove that it offers better quality standards. Even if the curriculum remains the same, the accessibility of the information through the internet facilitates the process to the students. It offers flexibility in choosing the time of their working sessions and better concentration. The distance learning in this case overcomes the problem of having to attend a post graduate class after working hours and also it offers a better working environment in front of the student's personal computer as classrooms in Egyptian universities are aging and some effort is to be made for modernization. The obstacle in having this course or other courses of the Alexandria university available through the internet is the ability of the university to provide the electronic infrastructure and the technical and pedagogical support needed. In the case of the authors, this constitutes a personal initiative and the university help is still sought in order to be able to provide the course electronically for all the students.

The evaluation system percentages are copied upon those of the university that imposes 60% for the final exam. The final exam is installed on the university computers and answered interactively in the classroom with the supervision of the university.

Although the designed course should be web-based, efforts by the course designers are made to use it even in class to introduce the students to the new system and to encourage the university to finance such a project. Students are getting accustomed with innovative ways of learning and are feeling their richness and convenience. No efforts are made for product commercialization since the authors engaged

in this experience in attempt to modernize education in their respective institutions.

V. Conclusion

A web-based interactive instruction system on port logistics has been presented in this paper. The simplicity of the software used in the programming enables immediate implementation of the tool wherever needed, provided some maintenance activities are offered. The authors experienced using the presented course with their students of the Alexandria University. The features of the used software seemed satisfactory for the development of the on-line course. Although interactivity and information exchange are present in the course, we think it remains limited. Future research includes testing the possibility of including distant interactive discussion sessions among the students together with the tutor or the professor. Besides, testing the tool on a larger scale is a must to help draw conclusions and propose some recommendations for the education modernization on the national level. Lots of social traits and characteristics of the Egyptian students will determine how to adapt the product to fit the culture. Finally, setting aside the authors effort, the tool presented is almost cost free and it requires very little maintenance.

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