EXPERIENCE IN THE DEVELOPMENT OF A COMPUTER COURSE FOR AGRIFOOD ENGINEERING

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Abstract

The agrifood industry is one of the most economically relevant sectors. The Universitat Jaume I (UJI) of Castellón, Spain, is teaching the Bachelor's Degree of Agrifood Engineering. The degree's aim is to equip students with the advanced knowledge, skills, and expertise to undertake technical and production management roles in the globally important agrifood sector. Ten professional profiles can be established for graduates in this degree. They range from those merely related to production to others involving information management, the environment, and territorial organisation.

The degree is composed by different courses. One of them is the computer science course. It addresses the necessary basic knowledge and competencies to produce graduate with the expertise and competencies required to select, deploy, control and manage computer technology and data in the agri-food sector.

The aim of this paper is to show the methodology and learning solutions used to teach the students how to use the information and communication technologies to improve competitiveness, productivity and sustainability in the agro-food sector. Paper shows the course objectives, the target competencies, the course contents, the assessments, and how the technology resources for e-learning are used to teach the subject.

Keywords: Information and communication technologies, Methodology and learning solutions, Agrifood Engineering, Curriculum Design.

1 INTRODUCTION

The suitable use of computer technologies can help advise on which crop to grow, how to manage resources such as water and soil, or when to apply fertilisers or pesticides. This advent of digital technology, drones and diagnostic services is changing the role of the agronomist. Agronomists will play a key role in understanding the latest technology and interpreting on that on the farm [1]. Therefore agronomists need a technological knowledge background, mainly in computer tools.

The Universitat Jaume I is teaching a four years degree in Agrifood Engineering. It includes a course related to computer science. It is an introductory course in the second year of the degree. The course is a challenge for the teacher and the students. It is necessary to train students in complex matters requiring a strong technology background that they do not posses. So, time of the course is dedicated (1) to the introduction of basic information and communication technologies, and farm software, and (2) to perform a practical work with the acquired concepts and the suitable tools.

This paper describes the computer science course of the Agrifood Engineering degree at the Universitat Jaume I (UJI) of Castellón, Spain. It shows the target competencies, the course contents, the assessments, and how the teaching methodology and the resources are used to teach the subject.

2 OBJECTIVES

The objective of the course is that the students acquire basic knowledge of computer technologies, to help in the farm decision making process. Specific objectives of the course are:

1) To orient & train the participants about the basic use of computers;

2) To Improve the skill of the agronomists in computer application;

3) To orient participants about different components of Information technology and enhance their capacity in use of ICT tools for farm management purposes;

4) To improve the knowledge of agronomies to access and interpret agriculture information;

5) To increase efficiency in Agrifood through proper use of IT;

6) To make aware participants with different tools of Information & communication technology.

3 LEARNING OUTCOMES/CAPABILITY DEVELOPMENT

3.1 Specific capabilities

- To understand how information and information systems can support farm management and daily operations

- To develop and use information systems for farm strategic planning and daily operations

- To develop graduates who are able to plan, manage and evaluate the development, acquisition, adoption and ongoing operation of Information and Communications Technology and systems in farm management and daily operations

- To consolidate the farm business process problem identification and solving skills, and to develop plans for action

- To increase technical skills through the designing and building of business and computer tools or applications to resolve specific farm problems.

3.2 Cognitive Capabilities

- Computer literacy.

- Analytic/design (conduct research, analyses, reason, solve problems, interpret data).

- Appreciative (evaluate ideas, make judgements, think critically, multidisciplinary perspectives, self recognition).

3.3 Behavioral Capabilities

- Personal (think and act independently, creativity, flexible).

- Interpersonal (listening, communicate, negotiate, group dynamics, collaboration).

4 LEARNING METHODOLOGY

Learning methodology combines classical lectures and active learning. Lectures are used to transmit information from the teacher to students simultaneously about the course contents. Lectures are a good way of providing an outline or overview of a subject of study.

To avoid the criticism of the lecture which is seen as a potentially quite passive and therefore not a particularly effective learning experience for students, active learning is used too. Active Learning involves students directly and engages them actively in the learning process itself.

Active Teaching Methods used in the course are: Practical work, Group work, Group discussion, and Case studies.

5 SYLLABUS/COURSE CONTENT

5.1 Lectures

A. THE FARM AND ITS LINKS WITH INFORMATION SYSTEMS

- Farm Lifecycle

- Strategy, objectives and policies

- Business Processes

- Functional, informational, decisional, and Resource Vision

- The business process modelling techniques

- Systematic approach to farm re-engineering processes

- Feasibility analysis

B. BASIC CONCEPTS OF INFORMATION SYSTEMS (IS)
- Definition of an information system
- Components of an information system
- Classification of information systems
- Information systems for farm processes
- Information system for farm management

C. FARM INFORMATION SYSTEMS (MIS) [3]
- Solving farm problems with information systems
- MIS Planning and Integration of within the Business Systems Plan
- Reference Methodology for the development of a MIS
- Implementation management of a MIS
- Farm Re-engineering with MIS

D. TECHNIQUES TO SUPPORT A MIS [4]
- Techniques for requirements definition
- Models and Modelling
- Structured Techniques: DFD, DCP, E/R
- Object oriented techniques: UML
- The relationship between the different techniques

E. INFORMATION TECHNOLOGY [5]
- Databases
- Communication Networks
- Artificial Intelligence
- rends in Information Technology for farm management

5.2 Active Learning

1. MS world, MS Excel, MS Power Point, MS project, MS Access advanced features [6]
2. Internet, email website launching and maintenance.
3. Remote sensing in Agriculture Development
4. Farm ERP's and SCM

5.3 Documentary work

Students must perform work on a topic of their choice related to the subject. The work should include:
- Problem definition.
- Diagnosis
- Proposal of improvement
- Improvement development and implementation plan.
- Impact measurements.

The work can be done individually or in groups depending on its complexity.

6 ASSESSMENT

The assessment percentages are determined by the University.
- Active learning work: 50%
- Lectures: 50%

7 CONCLUSION

This paper shows the curriculum design of a computer science course for agronomists. This curriculum has been developed by a teacher that teachs in the Agrifood Engineering degree. The course is organized in three blocks: lectures, active learning, and documentary work.

Students are very satisfied with course contents and organization. The curse combine lectures with practical work, so theory can be understood easier, and students obtain new knowledge and new skills, similar to professional work. In addition we use free software so students can do part of the work at home.

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