Education of Students of Economics for e-Society

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Abstract. *This paper presents the way of use of information technology in education of economists, particularly at Faculty of Economics – University of Mostar and course named Accounting Information Systems. It shows how IT could reshape the educational landscape by transforming the content and modes of acquisition of learning as well as how the implementation of IT is inseparable from the process of curriculum development and implementation of problem-based learning.*

Keywords. *Accounting Information Systems, Economists, Education, Information technology*

1 Introduction

Rapid development of information technology (IT) is redefining not only the way of working and communicating, but in turn, is redefining the way of education. Today's graduates are entering a world of employment that is characterized by greater uncertainty, extensive use of IT, speed, risk, complexity and interdisciplinary working. Modern university's education needs to prepare students for entry to such an environment and equip them with appropriate skills, knowledge, values and attributes to thrive in it. In reaching that goal IT could be crucial tool. There is a strong drive to build and create knowledge together with an appropriate use of IT and reformulate the concept of knowledge in learning situations. Applying information technology as a tool for learning in curriculum areas enables students to develop the knowledge, skills and capacity to use IT in specific field and to be more successful in achieving curriculum outcomes. Namely, IT plays crucial role during the problem-based learning process, serving as a critical tool for information searching, organizing and analyzing data, and presenting solutions.

The paper presents the way of use of information technology in education of economists, particularly at Faculty of Economics – University of Mostar and course named Accounting Information Systems. It is mandatory course for students of Accounting and Finance and Business Informatics majors. Accounting Information Systems course implements problem-based learning process through combination of the theoretical knowledge and practical problem solving by using different IT tools. Students focus attention on theoretical knowledge as well as peculiarities of solving problems. They are concentrating on operational context of the practical problem, trying to conceptualize it and deduce solutions acceptable in the project. Every student creates her/his knowledge and structure, makes sense of theories and parts of their reality in her/his own way.

Paper shows how IT could reshape the educational landscape by transforming the content and modes of acquisition of learning as well as how the implementation of IT is inseparable from the process of curriculum development and implementation of problem-based learning.

2 Accounting information systems (AIS)

Accounting Information Systems are usually observed as special type of Information systems that provide information related to financial aspects of business. In order to fully understand the meaning of AIS, it is necessary to define the terms it is consisted of: system, information system and accounting information system.

A system is a set of interdependent elements that together accomplish specific objectives [2]. Systems are almost always composed of smaller subsystems, each performing a specific function important to and supportive of the larger system of which it is a part [7].

Information system is a "set of people and equipment" interconnected by activities of collecting, processing, storing and distributing data and information with ultimate goal of generating information in different problem situations and at different levels of organization keeping in mind basic economic principles [5]. Every information system (based on computer support) has five main elements [5]: hardware, software, data, procedures and people. In a process of producing information essential for business decision, information system includes following activities [12]:

- Input – data collection
- Processing of data
- Storage of data

- Data distribution

A management information system (MIS) is a an integrated set of computer-based and manual components established to facilitate an organization's operational functions and to support management decision making by providing information that managers can use to plan and control the activities of the firm [2]. According to some authors [2], AIS is a specialized subsystem of MIS with purpose to collect, process and repost information related to the financial aspects of business events.

However, it's noticeable that these days AIS is dealing with, not only financial, but also nonfinancial data and information. Companies are taking even more into consideration the fact that traditional view at the organization as separate areas divided into functions (finance, accounting, marketing, human resources, production etc.) is actually limiting factor in efficient management of resources, including data. Here lies the basis for the need to observe AIS in broader perspective as an overall organizational system focused on business processes.

Basic elements of AIS are [2]: accounting and auditing principles, business operations, events processing, management decision making, control, systems development and operation, reporting, technology, databases, communications.

3 Course concept

The main aim of the course Accounting Information Systems at Faculty of Economics - University of Mostar is integration of knowledge that students acquired through courses Accounting and Business Informatics and to learn how to implement ICT in accounting. The course has four main topics: Business processes, Methodology of Information Systems development, Control of AIS and Business Intelligence.

In order to make students more familiar with advantages and possibilities of IT usage and to give the teaching and learning process greater significance in terms of students' experience and competence, the following concept of the classes has been developed:

Students are divided into groups, each group containing four members working on main topics of AIS course. Each member is responsible and presents just one topic, but is obliged to provide answers on other topics from his/her group elaborated by other members. Following their brief presentation on given topic, the course lecturers, but other students also, will ask questions.

Maximum amount of credits obtained this way is 60% from which 30% is awarded to student based on his/her presentation and 30% (3x10) based on the discussion and answers he/she provides on their colleague's presentation. Other 40% is obtained through oral examination (30%) and activity on class (10%).

Teams are formed by random choice by writing their names on pieces of paper and picking them out from the box which ensures diversity in character, personality, knowledge and skills in one group. This is supposed to illustrate the atmosphere in a real life company where people have to work as a team or company will not have positive business results.

The curriculum related topics included the selection of one business process and it's description, the description of current situation, the reasons and advantages of informatization, methodology of informatization, database model, control methods and the application of business intelligence. The detailed description of each of the topics follows.

3.1 Topic No. 1: The description and analysis of business process

There are numerous methods, tools and means of describing and analyzing current situation in the company. Some of them use textual descriptors, others are more graphical but they all have the same goal and that is to simplify, clarify and identify steps and phases of business processes, main entities, interactions etc. One of the most used modeling language, which is trying to cover a large set of design documentation, is Unified Modeling Language (UML). It's a general purpose modeling language in the field of software engineering, which is designed to provide a standard way to visualize the design of the system. [15].

UML defines thirteen types of diagrams, divided into three categories: Six diagram types represent static application structure; three represent general types of behaviour; and four represent different aspects of interactions. Structure Diagrams include the Class Diagram, Object Diagram, Component Diagram, Composite Structure Diagram, Package Diagram, and Deployment Diagram. Behaviour Diagrams include the Use Case, Activity Diagram, and State Machine Diagram. Interaction Diagrams include the Sequence Diagram, Communication Diagram, Timing Diagram, and Interaction Overview Diagram [15].

This topic also covers the justification for the informatization of the process. The students are supposed to think about the main issues with current systems, describe and elaborate them on one hand. On the other hand, they're supposed to study and present all of the expected advantages and benefits of the newly proposed solution. Likewise, students are supposed to propose a database model to store all the necessary information.

3.2 Topic No. 2: Suggestion and description of selected methodology for informatization of business process

There are numerous reasons for a company to computerize their business processes. Either, which is very rare these days, they don't have accounting information system so the employees are overloaded and the whole process is inefficient. Or, the current accounting information system is obsolete and thus inefficient and erroneous.

Also, some of the other reasons of implementation/upgrade are related to desire to:

- Ensure better support for making decisions
- Achieve competitive excellence
- Incorporate new processes in the company
- Utilize as many as possible of the benefits that recent technology has to offer
- Create an image of high tech company
- Adapt to changes in legislative

If the development of Accounting Information Systems is not approached in a meticulous manner, there's a lots of room for failure. Some of the reasons for failure lie in the: lack of support from the top management, constant change in user demands, development of strategic systems, interbreeding of different technologies, absence of project management standards and methodologies for IS development, unwillingness to work on the change of strategy, organization and business process if necessary, refusal to change, insufficient involvement of the users, improper testing and training of the users.

Once the decision to implement/upgrade AIS has taken place, still remains the matter of choosing the most suitable approach for AIS development. The methodology of AIS development is a process through which an information system will get completed. It is described as a number of phases, procedures and steps that give the complete IS.

In order for students to fully understand the process of developing any information system, the following methodological approaches are explained to them:

- Structured Methods
- Iterative and Incremental approach
- RAD – Rapid Application Development
- Object-oriented Methods

Here, student task is to choose methodology for development of IT support for business process chosen under topic 1, to explain why she/he chose this concrete methodology and to explain the way how that methodology could be implemented.

3.3 Topic No. 3: Suggestion and description of the method of control forth chosen business process

Every AIS is exposed to the series of threats: hardware and communication errors, software errors, involuntary behaviour leading to errors, deliberate production of errors (cyber criminal), natural disasters, terrorist attacks, political disasters and so on. Besides of these, every company is exposed to the

following risks on daily bases: strategic – goals of the organization, operational – processes that obtain those goals, financial – securing the assets, legal – law and legislative, reputational – public image. One way of handling these risks is establishing system of internal control. Internal control is a process conducted by the board, management and other employees, designed for the purpose of enabling the reasonable security in achieving goals in the following areas: effectiveness and efficiency of the operations, authenticity of financial reports, compliance with legislative [2].

Internal control is very important aspect of AIS. Unfortunately, there are numerous reasons for internal control not to be adequate and timely: absence of continuous supervision of internal control, the management is not included in the control system, the management doesn't obey the rules of the control, recklessness of the management, not respecting the details, dominating management, employee collusion, inefficient supervision of the Management Board, lack of properly trained control staff, rare or no control from third parties, deficient separation of duties, excessive confidence in key persons, vague lines of authority, inadequate documentation, no physical or logical security system, complex transactions, overcomplicated organizational structure and so on.

Also, intensive usage of ICT changes the ways of implementation of internal control.

Taking into consideration all of these issues, it's highly important for students to pay attention to internal control and to understand how it could be implemented, especially with extensive use of ICT. They have to decide how the chosen business process is going to be controlled to make sure that all information are verified and valid.

3.4 Topic No. 4: Suggestion and description of appropriate business intelligence techniques for selected business process

The business expansion, globalization of business and competition, the higher and higher customer demands, divergent and complicated state legislative and rapid development and implementation of ICT have led to enormous quantities of data which require quality, valid, smart and timely management in order to get meaningful information usable in the decision making process. Business intelligence provides an answer for this. The literature contains various definitions of business intelligence, and one possible definition is that Business Intelligence is the process of transforming data into information and afterwards to knowledge. BI can handle enormous amounts of unstructured data to help identify, develop and otherwise create new opportunities [14]. Business intelligence enables organizations to: make decisions based on facts, obtain quality information, produce

meaningful form of information, manipulate with quantity of information, share information.

Above mentioned activities are feasible by different methods and tools of data mining like: associative rules, k-means clustering, neural networks, fuzzy logic, decision trees, genetic algorithms and others.

Students should choose one method that, by their opinion, best suits to their problem area. They have to describe the input and output data in their example and, based on expected results, suggest some actions for further action to improve the existing business process.

4 Case study – Sales Business process

In order to help students better understand their tasks, one case study example was developed that could be used as a template for students' projects.

4.1 Topic No. 1

The business process that is going to be analyzed through this example is Sales process.

The primary purpose of this process is:

- Preparation of sale
- Market research
- Promotion
- Making contracts
- Delivery of goods
- Collection
- After sale services (customer support, maintenance etc.).

The actors and activities of this process are shown at the diagram on Figure 1.
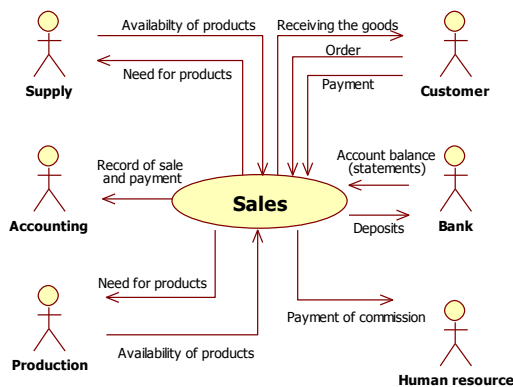

Figure 1. The actors and activities of sales process

The sales process is realized through four phases (subprocesses): taking order from the customer, shipment, billing and payment (collection). The following activity diagram represents the sales process (Fig. 2).
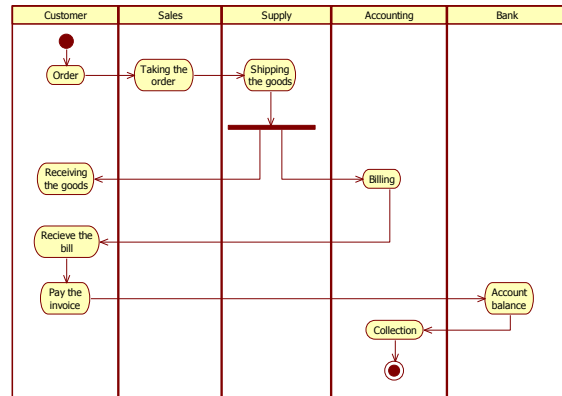

Figure 2. Sales process

All of sales subprocesses (SP) have been described using activity diagrams (Fig. 3, 4, 5, 6)
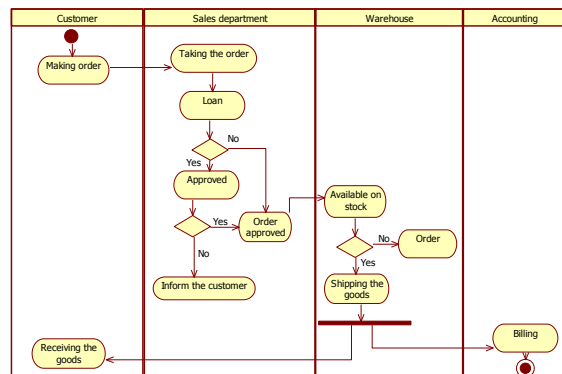

Figure 3. SP 1: Taking order from the customer
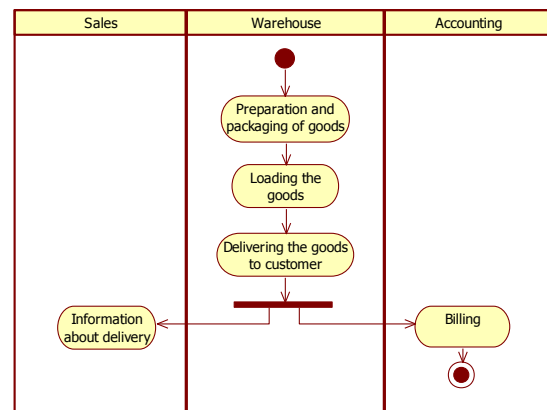

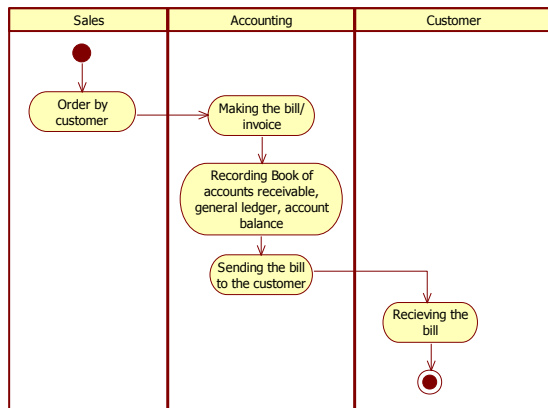Figure 4. SP 2: Delivery of goods
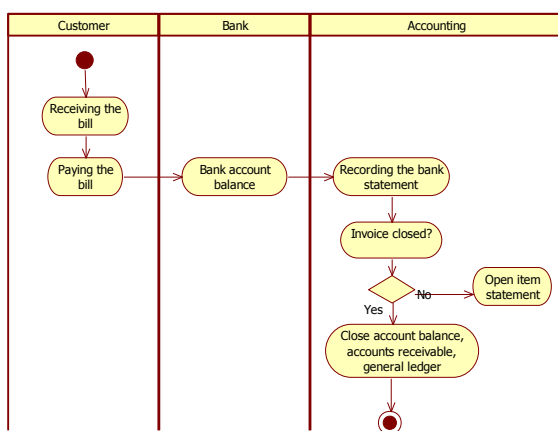
Figure 5. SP 3: Sales/billing

Figure 6. SP 4: Collection

The benefits of informatization for main parts of the sales process are defined in the following table:

Table 1. Benefits of informatization

Process/ activity	Possibilities of informatization
Taking order from the customer	• Enabling the other means of taking order: web site, e-mail, telephone, sales representative • Sales department using electronic way of informing the customer (e-mail, electronic data exchange etc.) • economical and efficient supply management – minimizing (eliminating) stock • Better and more detail CRM (Customer Relationship Management)
Shipping	• Fast locating for requested goods in the warehouse • Bar code readers • Identification marks of passive radio frequency • Bill of lading automatically updates the stock level • Bill of landing visible through ERP for accounting for further processing
Billing and collection	• Automatic creation of Book of accounts receivable • Automatic bookkeeping of General ledger and account balance bookkeeping • Automatic signalization for payment deadline • Built in ERP approval of authorized persons • E-banking

4.2 Topic No. 2

The scrum approach is selected because of its iterativity and agility, namely it is agile software development method. Scrum adopts an empirical approach—accepting that the problem cannot be fully understood or defined, focusing instead on maximizing the team's ability to deliver quickly and respond to emerging requirements [16]. Also, although it can work with any technology or programming language it is especially useful for web 2.0 and new media project thus being very contemporary.

The scrum approach focuses on the business needs of project when developing products and services. It strips away non-value-added activities and impels delivery by focusing on the immediate details [6].

The Scrum framework consists of [9] Scrum Teams and their associated:

- Roles – The Scrum Team consists of a Product Owner, the Development Team, and a Scrum Master. All management responsibilities in a project are divided among these three roles [10]
- Events – work is performed in iterations or cycles of up to a calendar month called sprints. Sprints are timeboxed so they always have a fixed start and end date, and generally they should all be of the same duration [8]
- Artifacts – product backlog (the listing of the requirements for the system or product being developed), sprint backlog, potentially shippable product increment [10]
- Rules – binds all parts together (e.g. Scrum recognizes no titles for Development Team members other than Developer, Scrum recognizes no sub-teams in the Development Team, Development Team members participate in the Daily Scrum etc.)

There are various benefits from using scrum and they can be observed from different perspectives:

- Client: the product is delivered more quickly; client can change priorities and their requirements throughout the development
- Organization: scrum advocates transparency, it's one of its main rules. Decision making is

put on lowest level, at the employees themselves who understand all of the facts.
- Management: motivated team members, visibility of the process
- Product: more quality product as a results, better product stability because of built in testing
- Team: true potential of the team is shown, safe working environment, sustainable work pace.

As already stated the sales process is realized through four phases and involves different actors. Each stage has its own specificities and each actor has its own requirements and the Scrum is, due to its advantages, very suitable for the development of IT support for that process.

4.3 Topic No. 3

The goals of control at the sales process are:
- Adequate authorization of all of the transactions
- All recorder transactions are valid (really took place)
- All valid and authorized transactions are recorded (stored)
- All transactions are correctly recorded
- Money, stock and data are protected from loss and theft
- Business activities are carried out efficiently and effectively

Threats and adequate control procedures are described in the following table.

Table 2. Threats and control procedures

Process/ activities	Threats	Control procedures
Taking order from the customer	1. Incomplete or inaccurate order from the customer 2. Crediting the customers with low ratings 3. Validity of the orders 4. Insufficient stock, high costs of managing stock	• Checking the data input, digital data exchange • Granting the loan by credit managers, not sales department; continuous monitoring of account balance of the customer • Signing the paper documents, digital signatures and certificates • Inventory management system, periodic

Process/ activities	Threats	Control procedures
		physical control of the stock
Shipping	1. Errors at delivery – wrong customer, address, quantity, good 2. Theft	• Additional verification of delivery, use bar code readers, control of physical approach, periodical lists, separation of duties
Billing	1. Errors on bill 2. Errors in records (books of accounts receivable, account balance bookkeeping , General ledger)	• Control at data entry, periodical harmonization of records
Collection	1. Errors at bookkeeping bank statements 2. Cash theft	• Separation of duties • Minimizing direct work with cash

4.4 Topic No. 4

Association rule mining finds interesting associations and/or correlation relationships among large set of data items [13]. Association rules analyze the interdependence (frequency of the relations) between all attributes showing how often they appear together. Results are presented in the form of rules between different sets of items, along with metrics like the joint and conditional probabilities of the antecedent and consequent, to judge a rule's importance [11]. The idea of mining association rules originates from the analysis of market-basket data where rules like ,,A customer who buys products x_1 and x_2 will also buy product y with probability c%'' are found [4]. To select interesting rules from the set of all possible rules, constraints on various measures of significance and interest can be used. The best-known constraints are minimum thresholds on support and confidence [3]. Given a set of transactions, the problem of mining association rules is to generate all association rules that have support and confidence greater than the user-specified minimum support and minimum confidence respectively [1].

Application of association rules allows users to recognize the connection in the sales process between the, seemingly unrelated, products (the frequency of purchase of some product is linked with the frequency of purchase of another product). It is possible to define the so-called consumer basket. Shopping centers are advised to use such models because they can bring various advantages for business. Aside from

the fact that targeted marketing increases sales and thus the revenue of the company, it also creates loyal customers who know that in that center they can find exactly what they need, and they can also gain different benefits. It should also be emphasized that the above method does not have to be used exclusively for the events that are happening at the same time, but also for those that occur sequentially, one after another, which proved to be very useful in direct marketing, with the aim of increasing sales.

5 Conclusion

Academic year 2013/2014 is the first academic year in which we used described approach of teaching and learning at the course Accounting Information Systems at Faculty of Economics – University of Mostar, but the results related to successful completion of this course in comparison to last five years (when students had continuous testing during the class - two mid-term exams and two test) were far better. In previous years, average passing rate through continuous learning was between 65-75%. The passing rate in this academic year was 87%. At the beginning of class we interviewed all students about their expectations from class and the most of them (94%) preferred examination through case studies and project approach. Also, at the end of class we interviewed them again to test their satisfaction with this approach of teaching and learning, and 89% reply their high satisfaction with new approach. The most of students confirmed that they developed deep understanding of topics through such a process of learning. They said that they could answer questions related to the domain of their case study by referring independently to an appropriate topic, developed the skills for implementing business process modeling techniques, data models, methodology for development of IS, implementation of internal control and business intelligence techniques. Finally, after class was finished they felt capable to answer the questions regarding the broad domain of practice by applying their theoretical knowledge and acquired IT skills.

Obtained passing rate results support the idea that this concept should continue to be applied in the future with constant updates in accordance with IT development. Also, it would be interesting to keep track of these students and to conduct a small survey few years from now about their experience from Accounting Information Systems course to check whether this kind of learning helped them during their professional life.

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