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MODERN APPROACH IN TEACHING PROJECT MANAGEMENT FOR IT SPECIALISTS

The modern world is not thinking without information technology. Training specialists not only fluent in IT technologies, but also those who know how to manage people and resources, is one of the main tasks of the IT university. This article focuses on teaching project management for IT students. The course covers the necessary set of knowledge and skills required for IT project managers. The main goal of the course is to teach students to focus on the organizational and managerial aspects of program projects. Along with various methods of project management (planning, budgeting and risk analysis), the main project management tools are considered; leadership principles; customer relations; liability issues; intellectual property issues; privacy issues. The article discusses the modern approach to teaching as a blended learning technology. This approach, combining traditional forms of education with elements of e-learning, is well applicable for a project management course. The features of the teaching of this course presented in the article are based on the personal responsibility of students for their own learning results. This also includes training based on mastery, an environment of high achievements, learning by doing. Actual methods in education as learning by doing, inverted learning and gamification are considered. The work also highlighted the role of "Project Management" in the student's general educational trajectory. In addition, the article presents the experience of implementing and teaching this course at the International University of Information Technologies. The Project Management course is one of 12 courses in the Software Development Program (SDP) cycle, presented by iCarnegie.

Keywords: project management; schedule and cost estimation; Agile techniques, Scrum, Risk Management Plan, Control Strategy Plan.

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СУЧАСНИЙ ПІДХІД У НАВЧАННІ УПРАВЛІННЯ ПРОЕКТАМИ ДЛЯ ІТ-СПЕЦІАЛІСТІВ

Сучасний світ неможливо уявити без інформаційних технологій. Підготовка фахівців, які не тільки вільно володіють IT технологіями, але і вміють управляти людьми і ресурсами одна з основних задач IT університету. Дана стаття присвячена методиці викладання курсу з управління проектами для IT-студентів. Курс покриває необхідний набір знань і навичок, необхідних для управлінців IT проектами. Основна мета курсу - навчити студентів зосередитися на організаційних і управлінських аспектах програмних проектів. Поряд з різними методами управління проектами (планування, бюджетування та аналіз ризиків) розглядаються основні інструменти управління проектами: принципи лідерства, відносини з клієнтами, питання відповідальності, питання інтелектуальної власності, питання конфіденційності. У статті обговорюється сучасний підхід у викладанні, а саме технології змішаного навчання. Даний підхід, поєднуючи традиційні форми навчання з елементами електронного навчання, може бути застосованим для курсу з управління проектами. Представлені в статті особливості викладання зазначеного курсу засновані на особистої відповідальності учнів за власні навчальні результати. Сюди ж можна віднести навчання, засноване на майстерності, середу високих досягнень, навчання на власному досвіді. Розглянуто актуальні методи в освіті, такі як навчання на практиці, перевернуте навчання і гейміфікація. В роботі також підкреслена роль «Управління проектами» в загальній освітній траєкторії студента. Крім того, в статті представлений досвід впровадження і викладання даного курсу в Міжнародному університеті інформаційних технологій. Курс «Управління проектами» є одним з 12 курсів циклу Програми розробки програмного забезпечення (SDP), представлених компанією iCarnegie.

Ключові слова: управління проектом; графік і кошторис витрат; Agile техніки, Scrum, план управління ризиками, план стратегії контролю.

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СОВРЕМЕННЫЙ ПОДХОД В ОБУЧЕНИИ УПРАВЛЕНИЮ ПРОЕКТАМИ ДЛЯ ИТ-СПЕЦИАЛИСТОВ

Современный мир не мыслим без информационных технологий. Подготовка специалистов, не только свободно владеющих ИТ технологиями, но и умеющих управлять людьми и ресурсами, одна из основных задач ИТ университета. Данная статья посвящена методике преподавания курса по управлению проектами для ИТ-студентов. Курс покрывает необходимый набор знаний и навыков, необходимых для управленцев ИТ проектами. Основная цель курса – научить студентов сосредоточиться на организационных и управленческих аспектах программных проектов. Наряду с различными методами управления проектами (планирование, бюджетирование и анализ рисков) рассматриваются основные инструменты управления проектами: принципы лидерства, отношения с клиентами, вопросы ответственности, вопросы интеллектуальной собственности, вопросы конфиденциальности. В статье обсуждается современный подход в преподавании, а именно технологии смешанного обучения. Данный подход, сочетая традиционные формы обучения с элементами электронного обучения, хорошо применим для курса по управлению проектами. Представленные в статье особенности преподавания указанного курса основаны на личной ответственности обучающихся за собственные учебные результаты. Сюда же можно отнести обучение, основанное на мастерстве, среду высоких достижений, обучение на собственном опыте. Рассмотрены актуальные методы в образовании, такие как обучение на практике, перевернутое обучение и геймификация. В работе также подчеркнута роль «Управления проектами» в общей образовательной траектории студента. Кроме того, в статье представлен опыт внедрения и преподавания данного курса в Международном университете информационных технологий. Курс «Управление проектами» является одним из 12 курсов цикла Программы разработки программного обеспечения (SDP), представленных компанией iCarnegie.

Ключевые слова: управление проектом; график и смета расходов; Agile техники, Scrum, план управления рисками, план стратегии контроля.

Introduction. The «Project Management» is one of the courses in the formation of the competencies of a modern specialist in information technology and occupy a central place in the educational program of «Information Systems» and «Computer Science and Software Engineering» [1]. The software development planning is one of the main stages of the life cycle of the software development process. In practice, when creating software,

various development models are used. Software projects can be differed from each other by different criteria. Therefore, the main goal of the course is to teach students to focus on the organizational and management aspects of software projects. The main objectives of the course are teach project management techniques for scheduling, costing, risk analysis, and project organization; to examine and objectively critique various kinds of planning and management artifacts; develop standard project management documents and supplementary artifacts; modern framework for managing the software development process; software development models; principles concerning teamwork, leadership, liability, intellectual property, confidentiality issues, and management of customer relationships.

Description of «Project Management» course. The course «Project Management» is one of the 12 courses of the Software Development Program (SDP) cycle, presented by the iCarnegie subsidiary (here in after iCarnegie). iCarnegie develops training materials for organizations or institutions that purchase SDP courses. These materials guarantee that teachers use materials based on the basic principles of pedagogical skill. Each SDP course is accompanied by a teacher training program, which provides a certificate to guide the course. The course «Project Management» focuses on the problems facing software development organizations in project planning, scheduling, costing, and organization of large-scale software systems. The software project management as an object of research began to be considered since the mid of 1990s. This was preceded by increased requirements for obtaining high-quality software, which grew much faster than the size of developed applications [2]. In this connection, in the early 2000s, the industry began to add to the title Software Project Manager to the role of software project management.

This course provides a solid foundation that can be used to manage and organize much larger and more important software projects. Students use project documentation for building and maintaining relationships with all project stakeholdersfrom end users, to various levels of user and technical management, to (very importantly) the project team itself [2].

Students study different project management techniques (scheduling, budgeting, and risk analysis); basic project management tools; leadership principles; client relationships; liability issues; intellectual property issues; confidentiality issues.

In addition, detailed design specifications are considered in terms of risk management and covers all of the essential topics life cycle develop software product. In particular it is development methodology as classical waterfall or modern approach as Scrum [3, 4].

For the course «Project Management» students must know Java programming language, know the principles of the object-oriented approach and the basic data structures.

After completing the course, the student will be able to generate the planning concepts needed to manage a group of resources to develop a set of requirements in a way that meets a customer's needs.

The course is based on project oriented approach. It means that several projects will be implemented. For example, students task is to create a system that continuously calculates a new price so that to get the most accurate price closer real-time pricing for a product for a customer in order to achieve a profit. The customer wants to avoid the issues associated with significant price fluctuations in a 24 hour period. This project is divided into parts in such a way each part allows to gain a particular skill during the solution.

To successfully complete the first part of the project, the students must understand the scope of the project and perform each of the following activities.

1. Create a sufficient detailed Scope so that the project is well understood.

2. The key requirements for the projects should be identified.

3. Business drivers and key constraints should be identified.

4. The Scope should be approved by management.

Advanced students can discuss some of the concepts associated with how to scope a project using Agile techniques. Students should understand that Agile and Traditional development techniques both provide mechanisms to capture the Scope and both require different levels of discipline to ensure that the needs are properly understood from the customer for the development project [3].

The next assignment is to generate an Estimate and Estimation Plan to complete the project tasks identified in the Scope. The students will most likely have to also generate a basic design and general Work Breakdown Structure (WBS) to complete the Estimation.

To successfully complete this assignment the students must perform each of the following activities.

1. Generate a general Work Breakdown Structure for the project tasks identified in the Scope.

2. Create a sufficiently detailed Estimate so that the key developments in the project are well understood.

3. Business drivers and key constraints should be taken into account from the Scope when doing the Estimates.

4. Use techniques to generate Estimates.

5. Estimate and Estimation Plan must be approved by management for the Estimate to be valid.

Advanced students can understand the basic process piece of an Agile technique called Scrum is the "Sprint" [2]. The student should understand that the key issue is fitting the work to the time available, not fitting the time to the work available.

The next phase of the project planning is to create the Risk Management Plan [2].

To successfully complete this stage the students must perform each of the following activities.

1. Create a sufficient detailed Risk Management Plan so that the project issues are well understood.

2. The key Risks for the projects should be identified in proper Risk format. All Risks should be written in the form of a fact and a consequence.

3. The Risk Management Plan should detail how the Risks will be identified and managed over the life of the project.

4. The Risk Management Plan should be approved by management.

Advanced students can review and understand planning from the Agile point of view, but in particular how does Agile or Scrum deal with the concept of Risk and manage Risks [3].

One of the most important stages in project management is Schedule for the Project [10].

The schedule must be clear and identify milestones. The Schedule Plan if done properly will show the customer all activities for the entire project and resources allocation.

To successfully complete the schedule the students must perform each of the following activities.

1. Create a sufficient detailed Schedule for the plan so that the dependencies and artifacts to be delivered are well understood.

2. The key tasks and milestones for the project should be easily identifiable from the Scope and Risk Management Plan.

3. The Schedule Plan should detail how the dependencies between tasks by showing precedence between tasks.

4. The Schedule should be approved by management and the customer.

5. Use tools such as Gantt chart and PERT chart.

Advanced students can adjust their Schedules to adapt to Scrum. Scrum as an Agile technique has a very basic philosophy associated with Scheduling called the Daily Sprint and the Overall Sprint, but these only give general guidelines. The Scheduling process now becomes more of what to put into the Sprints so that value can be delivered to the customer [3, 12, 13].

How to teach students to provide a reasonable Control Strategy for the Project?

The Control Strategy must be clear and provide management and team visibility into the status of the project. Students should keep in mind the following two questions when designing their Control Strategy for the project:

How is your project doing?

How do you know?

The Control Strategy plan will provide clear visibility into the project for all stakeholders. To successfully complete The Control Strategy plan, the students must perform each of the following activities.

1. Create a sufficient detailed Control Strategy for the plan so that check points and in particular go/no-go decisions are well understood.

2. Include the key ideas for ensuring that project is being properly monitored and moving to a proper conclusion.

3. The Control Strategy Plan should detail how the product will be delivered with the right quality, in the right amount of time, and with the proper features to meet customer expectations.

4. The Control Strategy should be approved by management and the customer (if the customer is required to provide support for the strategy).

At last students should create the overall Project Management Plan for the Project.

To successfully complete Project Management Plan, the students must perform each of the following activities. For this purpose students should transfer all the information currently they have to the new project template format. The template will be prepared beforehand and uploaded to LMS system.

The method of learning-by-doing in the process of work. Learning-by-doing activity implies to the fulfillment of individual and small group tasks completed in a situated, context-rich environment that authentically mirrors the workplace as the software architect.

This environment, called "backstory," uses an approach called story-based learning that defines a student as a junior trainee in a software company, where the student will solve problems that are close to those faced by real companies every day. Most tasks will start with an e-mail from the "manager", with whom the student may need to discuss the details of the project. The student will also be provided with flow charts, specification requirements, as well as other documents needed to study the details of expectations from each project.

After completing the assignment, the instructor will perform two roles in addition to the basic traditional function as an instructor. It will act as:

- A manager who will act as a company director. As a manager, the teacher expects the student to perform well the work that the manager gives him, and the manager provides the information necessary to achieve the success of the project. The student must come to "work" prepared or with questions to the "manager".

- A coach who will help the student complete the assigned project. As a coach, the teacher directs the student to make a decision at their own discretion. The coach's instructions in most cases take the form of questions. The purpose of the coach is to force the student to think.

This approaches allow develop professionalism still from the student's bench, is as important as technical skill. Besides demonstrating computer know-how, students will need to work effectively in teams, examine problems from multiple viewpoints, ask questions and conduct research to ensure himself understand client requirements, and articulate her solutions clearly, using standard computing terminology. Having mastered these skills, students can count on applying them regularly once after graduate and enter the workplace [5, 6].

Another integral part of learning by doing is seeking and absorbing the hard-earned wisdom of seasoned domain experts in student's community of practice. So for these courses many hours are devoted to ask questions that students should be able to answer if they have completed their assigned readings. This means that all assigned readings must be completed before the class session where it is used.

Thus, the course is built on principles of modern blended learning technology [6, 8]. There are components as learning-by-doing, flipped learning and gamification.

Application and Experience of IITU. The International University of Information Technologies (IITU) since the day of its foundation has been cooperating with the structural subdivision of Carnegie Mellon University − iCarnegie. iCarnegie offers training materials and knowledge transfer around the world.

At the moment, other iCarnegie partners include such external organizations as academies Microsoft, Cisco, SAP, University Tenaga Nasional (Malaysia). All these organizations have the opportunity to provide valuable resources for IT professionals, they can play an even more important role for students who need to define themselves in the labor market.

Participation of students in these organizations can vary from educational certification capabilities to obtaining a place for practice, internships for advanced training and entry to work [7, 8, 10].

At the university, along with basic courses that meet the requirements of the educational standards of the Republic of Kazakhstan, iCarnegie courses are read. Students are provided with a set of educational materials, including curricula, textbooks, teaching materials (theoretical, practical guide, questionnaire) in electronic form, CASE tools, programming languages [4]. It should be noted the sequence of obtaining knowledge by the student.

Unlike the courses offered by the corporation earlier, these are ten courses of the Software Systems Development program [5, 6]. As noted earlier, iCarnegie has updated the content, including the course "Project Management".

A special role is played by the project-oriented approach of education and blended learning technology. For the entire course, students develop one system that runs in six projects together in teams. Teams consist of 3 or 4 students. The project is the closest to the tasks that are solved in real life, therefore, when the project is being implemented, team members evaluate the contribution of each student into the project, and also assess other students performing the role of employees of the organization.

Conclusion. Summarizing the results, we note the advantages of applying the teaching methodology learning-by-doing and blended learning. Students immediately "dipped" on environment, maximal as close to reality. They receive skills in team work. The distribution of roles between students within the team is provided to the students themselves. The teacher plays the role of manager. At the same time, a trusting relationship is established between the teacher and students. Assessment of the contribution of each student to the project is carried out by both teachers and all members of the team. Students evaluate each other on the following criteria: productivity; creativity; reliability; responsiveness; mutual assistance; motivation; activity; awareness; competence; participation; success; stability; organization; mutual respect; judiciousness; good attitude and behavior.

Presentations of projects as final's result allow students participate in conferences of professional organizations give students additional opportunities to interact with IT professionals, as well as the opportunity to showcase their projects to other organizations.

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