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Teaching Workflow Management

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Workflow management has become an issue over the past years, because of reported successes in industry and because it is reagarded as enabler for business process reengineering. This has caused a demand for education about workflow in university curricula and a demand for short courses in the commercial world.

Attendees to this workshop will learn how to teach workflow management to different audiences. The workshop gives a brief introduction to workflow, in order to move on straight into the issue of course design specific to workflow. The following issues will be discussed:

- identifying the learning contents, by matching the educational triplet (knowledge, skills and attitude) to the scope of workflow (business, methodology and technology).
- choosing appropriate means, by matching educational activities (classroom activities, individual assignments, projects, etc.) to means used in workflow management (workflow tools, literature, methods, etc.)
- Treating a workflow project as a learning process, teaching workflow to participants in a workflow process as a way of innovating the business.

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Workflow Management

Teaching workflow management requires a balance between the aspects of technology, organization, and methodology aspects. Workflow management is a discipline that studies the coordination, communication and control of organizational processes by means of information technology for the purpose of improving these processes. An organizational process contains the set of activities involved in handling an arbitrary number of similar cases, which typically stretches across boundaries of departments and organizations. A workflow process is an automated organizational process, which means that the coordination, communication and control within a process is done using information technology, but the activities within the process are either human, or automated, or a mixture of the two. Workflow management integrates aspects of technology, organization, and methodology.

A Course Design

In the academic year 1995-1996 I have designed and taught a workflow management course for MBA students majoring in computer information systems. This course is described here as an example of a workflow course, from which inspiration for other courses can be obtained. The design of this course was done using the didactical model of van Gelder (1979). It starts with a definition of goals, an identification of the audience, and a definition of the initial situation. It matches course organization and ways of meeting by looking at group forms, learning processes, learning content, media and work forms. Evaluation is integrated in the course design.

The main goal of this course is that students learn to apply concepts, techniques and methods in practical situations to analyze and design workflow applications. This goal has aspects of knowledge, skills, and attitude. The knowledge acquired involves the architecture of workflow management systems, the workflow concepts issues in workflow projects, criteria for a good workflow project proposal, knowledge (in varying levels of detail) of several tools in the market, theoretical foundations (e.g. Ellis and Rozenberg, 1995). The skills involve modeling an organizational process [Joosten, 1994], experience with two workflow design tools, assessing the quality of a process model, tool selection, interpreting real life situations in terms of workflow concepts. The attitude that students acquire is a critical attitude from an analyst's perspective, giving room to all three aspects (technology, organization, and methodology). They learn to see a modeling technique from a situational perspective [Kumar and Welke, 1992].

The audience in this course is homogeneous, because it consists of MBA Majors in Computer Information Systems. There are two types of students. About half of the students is full time, with no or negligible work experience.The other half is part time student, with full-time or part-time jobs at hand. This mix provided an interesting opportunity to bring processes from the "real world" into the class, and to draw on the experience of some of the students.

This course was scheduled in 18$\times$2h sessions, during the Spring quarter of 1996. The course consists of 4 blocks, each block containing one session about the organization, one about technology, and one about methodology. Each block is concluded by a review session in which no new material is presented, but the material of the previous sessions is rehearsed, questioned, and explained once again if necessary. Every session starts with a "flash quiz": a ten minute quiz of approximately five multiple-choice questions on the subject of the previous session. Other learning activities are listing to lectures, assignments, presentations, discussions, self-study (at home), and peer reviewing. The diversity in learning activities is necessary because of the mix of knowledge and skills. Grading is done on the basis of tests (60%), quizes (10%), and assignments (30%). Productive knowledge and skills are measured in the assignment grades, reproductive knowledge and skills by means of the tests and quizes.

The course materials are a book [White, 94], a reader [Joosten, 1996a], a syllabus with materials provided on the World Wide Web [Joosten, 1996b], electronic quizes taken on the web, access to two workflow design tools [Medina-Mora, 1992; Pallas Athena, 1995] and a video on CSCW [Tollmar, 1995]. The classroom contains 25 seats, each equipped with a computer which is linked to (and boots from) an educational network.

The course has been instrumental in the validation of a workflow analysis technique called Trigger Modeling [Schipper, 1996]. Evaluations show that students spend more than average time on this course, students like the course, and they think it is effective.

Issues

Issues in teaching workflow management are the interdisciplinary nature, confusion of terms, the absence of an established didactical format, the fast developments in the field (resulting in an unstable set of tools in the marketplace), and the dominance of vendors.

The interdisciplinary nature poses problems if an instructor is not sufficiently equipped in all three aspects (technology, organization, and methodology). This is resolved by using different instructors, or hiring instructors who can cover all three aspects. Either way, it makes a balanced and comprehensive workflow course more expensive, which poses a genuine risk to the quality of a workflow course. Emphasis on only one aspect, whether it is technology, organization, or methodology, sends the implicit message that the other aspects are less important or may even be neglected in workflow projects. The growing pressure to make courses cheaper should not be translated in neglecting the interdisciplanary nature.

Workflow management is perceived by many as a confusing field, for lack of a well defined terminology. Part of the solution is to adopt the Workflow Management Coalition's Glossary (1994), although it only covers technology. Using a conceptual framework [in: Joosten, 1996] has proved effective in resolving this problem, at least for the duration of one course.

Absence of an established didactical format makes it necessary to experiment with the right form of workflow courses. The length of the course is an important variable that limits the amount of learning that is feasible. In a short course of a few hours I usually teach the first step in modeling an organizational process, making sure that participants can make a model on their own. This communicates the main idea of thinking in terms of processes and gives participants a usefull skill at the same time. A longer course provides opportunities to study tool architectures, business impact, how to manage a workflow innovation, theoretical foundations, etc. The choice between these topics is made to suit the targeted audience. CIO's are served better by organizational issues, whereas application designers are more curious about technology. A full, comprehensive course, as described in the previous section, gives the opportunity to treat many of these aspects. The level of detail that is achievable depends on the type of participants. A homogeneous audience (e.g. only professionals, only managers, only students, etc.) is preferable, because it is hard enough to balance the various disciplines even without worrying about the variations in a class.

The fast developments in the field make it necessary to update courses regularly. The development cost of a course must therefore be paid back quickly in order to make the financial risk of developing a course reasonable. However, this offers some opportunities too. Demonstrating and/or using commercially available software is feasible with no worries whether the same product is used after a year. The course is being updated anyway. Drawing on resources from the World-Wide Web further helps to keep material up to date. In the same way, the dominance of vendors in this field can be turned into an advantage, by using their case studies, development methods. and tools.

Guidelines

Educational handbooks [e.g., Rijkers, 1991] provide a useful partitioning of learning goals in knowledge, skills, and attitudes. Workflow management is a discipline that covers technology, organization, and methodology. This has caused me to use a 3x3 matrix during the design of most workflow courses. It helps to strike the right educational balance and the right balance in workflow management at the same time.

Situational factors dictate much of what can be done in class. Seemingly simple things, such as having computers inside the classroom instead of in a separate laboratory, enable the use of valuable activities such as an automated "flash quiz" at the beginning of each session. The availability of tools in the class is valuable in giving the students a sense of practical value, even when these tools are only used for one or two hours during the course.

As most innovation processes, a workflow project is a (shared) learning process. When participants learn to value workflow modeling techniques not only for their result but first and foremost for the process of making them, they will use the modeling techniques in practice to facilitate the shared learning process. I think this is an important lesson to be learned from any workflow course.

Conclusion

The new field of workflow management has produced a demand for good courses. The volatility of the field, the different nature of audiences, and the growing cost of courses requires a careful didactical analysis to establish learning goals and to assemble an appropriate list of activities and materials. In order to be both efficient and effective, each activity in a course must be instrumental to a goal, or else be removed from the course.

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- Many more references to workflow research can be found on the World Wide Web: "http://www.cis.gsu.edu/~sjoosten/survey.html"