

Improving the quality of student project work

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Abstract

Students from all disciplines should be encouraged to collect, analyse and evaluate time spent on developing project work. Tasks and processes such as gathering content, meetings and other group related issues must be recorded and analysed. Time management is an important generic skill and should be nurtured in order to help promote the quality of student project work.

Collecting time management data is usually an arduous task for many students involved in group-work. Student teams often do not collect time spent on activities accurately, and if they do, it is often on scrap pieces of paper without proper categories, which later requires much effort to analyse.

Evaluating accurate timesheet data can result in higher order thinking - interpreting and evaluating how resources were used in the project. This type of analysis and reflection is a valuable generic skill, required in most project work, both in academic and workplace environments ie how effectively were resources used and could improvements be made? How could these improvements be implemented in future projects?

A time management tool was developed in order to assist students in efficiently collecting and analysing timesheet data. This was sponsored by an AUDF grant in 1997 and is still undergoing evaluation and development. The tool provides students with a means of quickly and accurately recording and analysing timesheet data, which allows more time for the team members to reflect on the overall project effort.

Introduction

Employers are becoming increasingly vocal about the lack of team skills shown by higher education graduates and are clearly dissatisfied with the quality of graduates, even though their academic scores may be quite high. A study by Marginson (1993) revealed that the three most desired characteristics of university graduates by business and industry in Australia were communication skills, capacity to learn new skills and the ability to cooperate as part of a team. Employer's views are consistent with many academic research findings that indicate high school teachers and tertiary lecturers teach too much content and do not promote generic skills such as communication and teamwork (Bennett, Dunne & Carre 1999; Candy 1994; Oliver & McLoughlin, 1999).

Also, research among business managers in Australia indicates that the work environment is perceived to be highly stressed and competitive, and businesses everywhere are straining to get "more from less", particularly in team based environments. As a result, managers feel themselves under severe time pressures [ACNielsen Research Services, 1998]. Students from all disciplines must be encouraged to reflect on how resources can be used more effectively, and how group work can be optimised when performing project work. Overall resource allocation must be continuously analysed and evaluated during each phase of project work. Reflecting on historical performance enables teams to also predict resources and effort needed in future projects.

Increasingly, higher education institutions are expected to take students beyond the possession of just content knowledge and help develop students' higher order thinking skills. "Merely being able to repeat quantities of information on demand is not evidence of a change of understanding" [Ramsden, 1992 #38, p. 4]. Time management is one of the many generic skills that project managers and team members involved with group work must be concerned with. Careful analysis of timesheet data during and after each project can greatly assist in optimising effort and time expended. By collating time into specific categories, analysis and evaluation can be made according to the following units of measurement (metrics):

- the overall project cost versus budgeted/estimated cost
- the cost of each resource, team-member or project phase
- the cost of each process or identified category that needs measuring

- other costs related to resource usage

Metrics obtained from a historical record of how and why resources were used previously used can then be contrasted and refined for current and future projects. This information is particularly relevant for making realistic calculations of future project work such as tenders and quoting for contract work.

In order to help students with the process of collecting, analysing and evaluating data, a computer-based application tool was developed through an AUDF grant, which automates the recording process of timesheet data entry and analysis.

The development of this application is grounded in research surrounding the use of cognitive tools to support learning (Jonassen, 1992) as “generalisable tools that can facilitate cognitive processing” (p.2). Reeves (1996), contends that technology in education involves the application of technologies as cognitive tools. His perspective is based upon the assumption that we learn best "with" technology rather than "from" it: “Computer-based cognitive tools can function as intellectual partners with learners to enable critical thinking and the construction of robust mental models”. The time management tool developed using the AUDF grant is a cognitive tool designed to help students with analyses of how effectively time and effort are used in group work.

Case Study

Final year students enrolled at Edith Cowan University in the IMM 3228/4228 unit are required to develop skills and expertise in project management methodology, in a simulated project development environment. Students are required to develop skills in analysis, design, development, evaluation and other project management aspects such as contract development, copyright, costing, scheduling, quality assurance and communication with clients and team members. After completing this unit, students are then required to do a final project unit, which is industry based. This deals with “real” clients and the students provide multimedia solutions to “real” industry problems.

The inclusion of these project based units in the multimedia course was to enhance the students chances of gaining employment by developing skills which have been identified by employers as being necessary in industry. Generic skills such as teamwork, collaboration, problem solving, time and self-management and peer/self assessment is all needed in the commercial multimedia world. (Collis, 1997)

These units are in the last year of the course and run over fourteen weeks (three-hour classes) which are a combination of traditional lectures, team-based activities and on-line discussions that consolidate multimedia skills learnt in other units.

The units are heavily focused on promoting collaborative skills and conflict resolution between team members and client in order to assist in the smooth development of the product. Therefore, it is important to provide an environment that promotes collaboration for discussing project management methodology issues and also for teamwork issues needed for building a multimedia product. Each student team consists of about four students who are responsible for different aspects of the project development.

There are three assignments based on three major project management phases of analysis, design and development. The students’ final mark is a combination of the following:

- project team mark which involves teams of four students acting out the roles of project manager, graphic designer, programmer and content developer in order to build a web page, produce professional reports/contracts and analyse the process
- Listserv mark, which is based on a problem solving activity related to project managing the development of multimedia product
- Individual reflections, which are students comments about what went well, badly and how the process could be improved
- client mark reflecting the students professional approach
- peer assessment mark, which enables students to assess their team members contributions, and negotiate marks if appropriate

In each assignment, students are required to collect data that clearly shows what processes they are involved in, and how much time they spend performing each of these. They are required to analyse this data in order to comment on resource utilisation and develop metrics for the overall project. However, a problem identified in the unit was that students were required to perform many new tasks that caused cognitive overload and confusion. These tasks included learning about project management methodology, being a team member and assessed by peers, contributing to a Listserv, preparing team and individual written assignments, recording and analysing timesheet data and developing a multimedia product. Each of these items was assessable.

This left little time for the students to carefully collect and analyse timesheet data. It became apparent that collecting timesheet data to produce valid metrics was a difficult task. Students found it difficult to collect timesheet data in the first few weeks of project start-up, as the team had not formalised a timesheet recording procedure. Often this resulted in timesheet data being used that was not accurate, as students generally relied on memory to complete timesheets at a later stage.

Correct analysis and reflection was needed of timesheet data in order to consider how the project could be more efficiently executed. By not correctly collecting timesheet data resulted in students not performing meaningful evaluation and analysis of team, individual and overall project metrics. Meaningful teamwork discussion of resource allocation during the development of the project was not occurring. Reflecting on how time was spent on the project by each team member can provide valuable information that would be the basis for improving metrics.

To help overcome some of these problems, a consistent set of phases, roles and categories were developed as shown in figure 1. Team members used this tool for recording data onto timesheets, GANTT charts, spreadsheets for costing, project management and even as their project diary.

The Solution

A timesheet data collection tool was developed to help students improve the quality of collected data and its analysis. The tool automated the process of data entry, report creation and analysis. It was built using FileMaker Pro version 4, a database software development application that is accessed via the web.

As shown in figure 1 the application requires the user to enter information in the given form by using the mouse. This not only speeds up data entry but also eliminates double data entry by the project manager and minimises errors in spelling and typing.

Using the built-in features of the database to sort, filter and create summaries the application produces meaningful, commercially focused reports. These reports allow the project manager to produce invoices for services rendered and payment to team members/consultants. It also provides overall project tracking of what individual team members are doing and time spent on different roles compared to budgeted time.

Reports can be produced for the total time spent by all or individual team members on their different roles. This is important for tracking overall project time, and for billing clients.

Recommendations

We have found that students find collecting and analysing timesheet data a tiresome and difficult task. To help overcome this problem, students must be convinced that the process of collecting and analysing data is worth while both for better group work analysis and also for industry career generic skill development. Some recommendations, to help assist tutors in promoting and supporting the development of metrics in group based work based on strategies that we have gleaned over the last two years of developing and evaluating the tool follow:

- make students use consistent categories/roles as shown in figure 1 which gives a clear message about the required categories/roles and allows benchmarking between projects, and over different semesters
- at the beginning of semester give students examples of what metrics are and how they are used, so they understand reasons for collecting and analysing data. Create some reports with examples of timesheets that illustrate poor and good usage of team project time. These reports would be used to focus discussion on the importance of metrics
- discuss the usefulness of metrics and how they are used in industry

- as part of the assessment in each assignment, include reflective questions about how time and effort was used and how it could be improved.

IMM4201		Project Name <input type="text"/>
Student ID <input type="text"/>	Project ID <input type="text"/>	
Phase		
<input type="radio"/> Scope & Contract <input checked="" type="radio"/> Design Specification <input type="radio"/> Production <input type="radio"/> Hand-over		
Role	Category	
<input type="radio"/> Project Manager <input type="radio"/> Graphic Designer <input type="radio"/> Programmer <input checked="" type="radio"/> Media Producer <input type="radio"/> Instructional Designer <input type="radio"/> Student	Admin-Other (Needs Comment) Admin-R&D Admin-Scheduling Admin-Travel Documentation-Project Diary Documentation-Reports Documentation-Assignment Work Documentation-Scope & Contract Documentation-Design Spec Documentation-Hand-over Communicating-Client Communicating-Team Communicating-Others (Needs Comment) Content-Acquisition Content-Copyright Design-Other (Needs Comment) Design-graphics(2D) Design-graphics(3D) Design-Instructional Design-Interface Design-SB's & Rapid prototype Media-photos Media-sound Media-video Programming-application Programming-coding Programming-HTML QA - Change control, version control, naming QA - Evaluation & testing QA - Procedure development & templates	
Comments		
<input type="text"/>		
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Thu, 2 Mar 2000		
Time spent		
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Figure 1. Timesheet Data Entry Tool

To help achieve these recommendations, the use of the timesheet data collection tool allows the collection of data in a quicker, easier and more accurate fashion than traditional methods. It is hoped that over time, this approach will allow for the creation of benchmarks for different types of multimedia projects such as Web brochures, E-Commerce sites, Kiosks, CD-ROM's and a set of metrics for different standards in multimedia development for graphics, animations, coding sequences etc. This information could be published in a Web site.

The unit web site can be viewed at <http://www-scam.cowan.edu.au/units/imm3228>. Projects developed by students can be viewed at <http://www-scam.cowan.edu.au/projects>.

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