TECHNOLOGY ENHANCED LEARNING

Practical Design Patterns for Teaching and Learning with Technology

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Practical Design Patterns for Teaching and Learning with Technology

Trails in Education: Technologies that Support Navigational Learning

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This book is about sequences of learning objects ordered according to time or according to the demands of given learning materials. As users navigate through a learning environment, they follow prescribed trails and create personal trails through their interactions. In digital learning environments, these trails can be stored, evaluated and accessed in a structured manner. Experts from different backgrounds shed light on different aspects of trails and navigational learning. Its chapters contain an investigation on how planning and evaluating trails can support curriculum development, a review of personalised learning and collaborative learning, a model which tackles issues relating to knowledge acquisition and cognitive aspects of trails, and a demonstration of how trails can be visualised.

The target audiences are: professionals, practitioners and researchers interested in educational science, e-learning and computer-enhanced learning, computing in education, curriculum studies, instructional design, or computer-supported personalised and collaborative learning.

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INTRODUCTION: USING DESIGN PATTERNS TO DEVELOP AND SHARE EFFECTIVE PRACTICE

Education aspires to bring about change; whether to change individuals and societies, or to change knowledge, attitudes, and practices. The act of devising plans of activities, resources, and tools to achieve such change is an act of learning design. This book sets out to share design knowledge about the use of technology in teaching and learning, and to explore how we might best share this design knowledge amongst educators, but also between educators, researchers, and technology developers.

The first part of this chapter, entitled *Design for Learning,* is directed at practitioners who wish to use this book to access, use and modify existing patterns. The second part of the chapter, entitled *A methodology for developing design patterns,* contains some more technical and specific information for those who are interested in the methods by which we derived these patterns and who wish to apply them in the development of new applications of technology to teaching and learning, or in research.

DESIGN FOR LEARNING

> Teaching is not rocket science. It is much, much harder than that. Rocket science is about moving atoms from a to b; teaching is about moving minds (Laurillard, 2012, p. 5).

Teachers face learning design challenges throughout their practice, and new design challenges are continuously thrown up both by new topics and by the use of new technologies. The advice available to support teachers in this task of learning design is usually either provided in the form of pedagogic theory, or in the form of anecdotal descriptions of someone else's practice. The first approach is usually too general and abstract to be useful and the second is often too ad hoc or context specific to be easily applicable more broadly. The teacher is left with the hard tasks of operationalising the theory on the one hand, or of determining what is relevant and what irrelevant detail in the second. There is an acute need to find effective ways of sharing design knowledge, particularly if practitioners are to make any headway in building on the success of others in a cumulative manner. Design patterns provide a way of addressing this issue by providing guidance which is abstracted from practice and informed by theory in a way which makes them more easily translated into effective

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practice. The concept of a design pattern was originally developed by Alexander (Alexander et al., 1977), in the field of architecture. He argues that a design pattern

> "describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice".

This book is a collection of such design patterns for the use of technology in teaching and learning, which can be used by educators to help them design effective educational practice. It provides a set of practical and usable design ideas that, rather than being prescriptive, provide open solutions to concrete needs, and that can be modified and developed.

We used the Participatory Pattern Workshops (PPW) methodology (which will be described in more detail in the second part of this chapter) as the means to develop these patterns. These workshops were practical in that they were closely related to teachers' everyday practice, and participatory in that they were driven by participants' professional experience.

HOW TO USE THIS BOOK

The primary way of using this book is as an off-the-shelf problem-solving resource for educational practitioners, identifying patterns that meet their needs. The patterns are not set recipes, a practitioner may apply the same pattern many times, each time in a different way. Each pattern is accompanied by design narratives that set the wider context in which the patterns were developed, and by scenarios which project forward to possible novel applications of the patterns, illustrating how they can be adjusted to these new situations.

A second way of using the book is as a straightforward literature, a cohesive set of ideas supporting reflection on the application of technology to learning, and the challenges and potentialities that arise.

Finally, we hope that practitioners will find inspiration in this book to follow a similar process of identifying cases of problem-solving in their own work, extracting patterns, and using these as a vocabulary for design level conversations in their professional environment.

THE STRUCTURE OF THE BOOK

The book contains four sections addressing the themes of *Learner centred design*, *Learning communities*, *Social media and learner interaction in social spaces*, and *Assessment and feedback*. In each section we have brought together a set of design patterns around a theme, together with design narratives from which they were derived and scenarios in which these patterns are applied to new contexts. These form the basis for a set of related patterns which we describe as a 'pattern language' for that theme. In order to get as clear an expression as possible of the patterns,

each narrative and pattern was peer reviewed by other contributors to the book, and 'shepherded' by the editors, whereby authors were given continuous support in their development of the patterns through multiple iterations of refining their text. Despite these attempts to develop consistency, the reader will find that each section adopts a slightly different style of presentation, so for example the patterns in *Assessment and feedback* section are perhaps less abstracted than those of the other sections. We present below a brief account of the patterns which are described in each of these four sections, as a guide to the content of those sections, and to enable the reader to more quickly identify areas of interest. The names of the patterns discussed are indicated in capital letters so that they can be readily identified.

Learner centred design

In this section of the book we present a set of six patterns related to the theme of learner centred design. These patterns are highly diverse in terms of how they relate to the learning and teaching process. The INTERACTIVE LECTURE MODE pattern can potentially be used to design a complete course, whereas the SPOTLIGHTING LEARNING PROCESSES and SHOWCASE LEARNING patterns are intended to be used as adjuncts to the existing teaching-learning activities in a course. The REACTION SHEETS pattern is meant as a companion activity to a course's core teaching and learning activities. The ACADEMIC WRITING SKILLS pattern focuses on the learners' individual backgrounds and is most powerful in multi-cultural and multi-lingual settings. Finally, the CONTENT MORPH pattern focuses on enabling teachers and researchers to transfer good educational ideas for student-oriented designs across topic areas.

Learning communities

In this section of the book we present a set of six patterns related to the theme of learning communities. The pattern COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY analyzes the needs and the different roles needed to succeed in managing online collaboration for designing a course. The pattern GROUP HOME RE-LOCATION describes the factors that need to be considered in selecting the tools that best fit the needs and preferences of team members. Two patterns address the challenges thrown up by cross-cultural communication. First, the pattern CROSS-CULTURAL MEDIATOR which describes the mediating role of a person who is familiar with the different cultures involved and second, LOCAL COMMUNITY MEETING where students come together in local meetings to discuss their experience of different cross-cultural teams. The pattern GROUP LEADER EMERGENCE describes the role of leadership in self organising groups, and WATCH ACTIVE MEMBERS encourages facilitators to validate active team member's contributions to online discussions.

Social media and learner interaction in social spaces

In this section of the book we present a set of nine patterns related to social media and learner interaction in social spaces. Drawing on the description by Jenkins et al.

(2007) of the concept of a culture of participation, these patterns are organised into three groups representing aspects of participation.

– Designing – the three patterns in this group describe problem solving approaches to building environments that support productive participation. ONLINE FORUM FOR ELEARNING outlines the logical design structure and teaching practices involved in the creation of an asynchronous online learning forum. CAN YOU HEAR ME highlights the importance of understanding how virtual communication channels differ from real world settings. CHOOSING THE RIGHT BLEND considers the choices that need to be made in selecting tools and providing ways to negotiate their use.
– Scaffolding – the three patterns in this group relate to the process of moving isolated individuals towards productive social interaction within groups. SET GROUND RULES outlines the foundation and baseline expectancies that need to be addressed in advance of running a synchronous text-based chat session. WEAR YOUR SKILLS ON YOUR SHIRT acknowledges that collaboration is dependent on participants indicating their skill set. TOUCH POINTS proposes a game-based format for helping students come to an understanding of how others perceive, react to, or share their visions, actions and understanding.
– Communicate – the three patterns in this group relate to managing the channels for synchronous and asynchronous communication. NO TELLER WITHOUT LISTENERS highlights the importance of being an active listener and the need to draw out less active users from lurking through to participation. CONTROL THE FLOW addresses the mechanics of synchronous text-based chat and finally DO AS I DO describes how students can learn to relate to one another and become encultured into an online community and learning environment

Assessment and feedback

In this section of the book we present a set of eight patterns related to assessment and feedback. A framework based on the key strategies for formative assessment identified by Black and Wiliam (2009) is used to structure the presentation of the patterns.

– Three patterns are related to the formative assessment strategy 'Engineering effective discussions, tasks and activities that elicit evidence of learning'. BLENDED EVALUATION brings together a variety of forms of evaluation in an assessment. CHAOTIC MULTIPLE CHOICE TEST is designed to reduce guessing in multiple choice question tests and to reduce effort in test construction. E-GEO-ASSESSMENT combines assessment standards with the use of an open web map service (WMS) in order to create new types of questions to enhance the assessment of geographical skills.
– Two patterns are related to the formative assessment strategy 'Providing feedback that moves learners forward'. FEEDBACK ON FEEDBACK provides a means of improving tutors' feedback to students so that it provides opportunities to improve the learning experience. FORMATIVE EXCEPTION: CLOSING THE LOOP FOR EXCELLENT

STUDENTS addresses the issue of providing feedback to students who are already doing well on a course, feedback that would help these students to replicate this performance across different contexts and situations.

– One pattern is related to the formative assessment strategy 'Activating students as learning resources for one another'. GENERATE & USE AGREED STRATEGIES is a pattern in which students review and develop their own strategies for tackling a set of tasks through a series of small group and whole group interactions.
– Two patterns are related to the formative assessment strategy 'Activating students as owners of their own learning'. TRY ONCE, REFINE ONCE describes a two-step question-answering system which encourages students to carefully consider their initial answers and on receiving feedback on their errors, to give careful thought to the refinement process. HINT ON DEMAND makes hints accessible to students, but only when they actively demand them and not before they have started working on the task.

USING THE PATTERNS

This book, therefore, presents four pattern languages on the themes of *Learner centred design, Learning communities*, *Social media and learner interaction in social spaces*, and *Assessment and feedback*. Though we have presented these patterns in as consistent a manner as possible, it will be clear to the reader that some of the patterns are better developed and articulated than others, some draw heavily on practitioner voices and others more on researcher and developer voices, and we may not always have succeeded in bringing these into a coherent relationship with each other. This, therefore, remains work in progress and there is scope for further development, but that is the nature of design patterns. It is now for others to try to use these patterns, to refine them, develop and add to them.

A METHODOLOGY FOR DEVELOPING DESIGN PATTERNS

The reader can, without prejudice to his/her ability to understand the rest of the book, or to use and modify the patterns presented there, skip the following section, which presents further details of our methodology, its theoretical and empirical background, and its future directions. This section will perhaps be of most interest to developers, and researchers in education, technology and design who will find it useful as an introduction to a design-based methodology which connects research to practice.

Why design patterns?

Designing effective educational technology and technology-based activities is a daunting challenge (Beetham & Sharpe, 2013; Mor & Winters, 2007). This is because the technology and the educational practice need to co-evolve and thus no designer

has a fixed reference point. Ideally, technology should allow all stakeholders in the educational endeavour – learners, parents, teachers, educational designers and policy makers – to constantly experiment and improve their practices, thus becoming partners in a continuous culture of participatory educational design. This is only possible if we can find ways for discussing education, and technology's role, at a design level: to describe situations and the challenges they espouse, identify possible solutions to these, and discuss them in a critical manner.

The challenge is even greater when several actors are involved in the development and implementation of an educational intervention. Here, where responsibilities are divided between parties, they must find a common language for collaboration and co-ordination at the design level in order to create meaningful learning and teaching experiences.

Thus we are confronted with the complicated challenge of capturing and sharing distributed and dynamic design knowledge in education. This knowledge relates to the design of tools, activities, social configurations, and the synergies between them. Our solution to addressing this problem is through the iterative development and use of design patterns.

The last decade has witnessed a growing acknowledgement of the design pattern paradigm for research and practice in the learning sciences (for examples see: Bergin, 2000; Goodyear et al., 2004; Brouns et al., 2005; Retalis et al., 2006; Mor & Winters, 2008; Winters & Mor, 2009; Bergin et al., 2012). Most recently, Laurillard (2012) has presented an argument that teaching itself should be seen as a design science, and that by representing and communicating their best ideas as structured pedagogical patterns, teachers can develop their professional knowledge collectively. This book builds on this growing tradition, and adopts a specific methodology which is described in the following section.

The Participatory Pattern Workshops Methodology

The Participatory Pattern Workshops (PPW) methodology is a product of reflection on scores of workshops conducted over several years (Mor 2013; Mor & Winters 2009; Mor, Winters & Warburton 2012).

The workshops are practical in the sense of 'related to practice', and participatory in the sense that patterns are developed by practitioners. These workshops have ranged from one-off events of several hours to series of three to five encounters, each one up to a full day. Each event or series has been dedicated to a particular theme, and the primary outputs were relevant to the participants interested in that theme. These outputs included design narratives, design patterns and design scenarios of varied maturity. They also included the insights the participants derived from their experience that allowed them to perceive their domain with a new perspective: a design view that transcended the clutter of daily detail, but was still readily applicable for them and their peers. It is here that the power of design patterns becomes visible

via their non-prescriptive nature. This allows experts to share their knowledge without imposing a singular method of solution.

In order to enable a culture of critical, informed and reflective design practice we need a framework for communicating design knowledge: the knowledge of the characteristic features of a domain of practice, the challenges which inhabit it, and the established methods of resolving them. Several representations have been proposed to this effect: design narratives (Mor, 2010; Barab et al., 2008), design principles (Kali, 2006, 2008; Linn et al., 2004), and design patterns (Derntl & Motschnig-Pitrik, 2005; Goodyear, 2005; Mor & Winters, 2007; Retalis et al., 2006). The PPW methodology utilises two of these – design narratives and design patterns - and projects the first into the future, to form a third representation – design scenarios.

Design Narratives Design narratives illustrate a critical problem by demonstrating its manifestation and resolution in a concrete context. They are first-person accounts of practitioners' experience detailing a challenge they have faced and successfully overcome. These include both technology experts developing new technologies for learning, and educators finding effective ways of using technology in their practice.

Design narratives provide a 'thick description' of a design experience, allowing critics to assess the validity of the designers' claims, and trace them back to evidence. At the same time, design narratives provide sufficient contextual information for those who wish to apply a similar design in proximal settings, be they fellow designers or practitioners wishing to learn from the experience.

Design Patterns Whereas design narratives represent design knowledge extracted from empirical evidence, capturing and interpreting the designers' experience. Design patterns attempt to organize this knowledge into modular structures.

Design patterns distil the reusable elements of design from distinct cases, so that they can be immediately applied in new situations. A design pattern captures a recurring problem, the context in which it occurs, and a possible method of solution. They are derived from experience and backed by theory, abstracted one step away from the concrete yet still applicable to real-life situations.

The design patterns paradigm (Alexander et al., 1977) was developed as a form of design language within architecture. This was done with the explicit aim of externalizing knowledge to allow the accumulation and generalization of solutions and to allow all members of a community or design group to participate in discussions relating to design. These patterns were organized into coherent systems called pattern languages where patterns are related to each other. The core of a design pattern can be seen as a local functional statement: "For problem P, under circumstances C, solution S has been known to work". Such a structure reads like a direct generalisation of the narrative form, when that narrative is a record of a problem solving effort, in other words, a design narrative.

Design scenarios Scenarios demonstrate the application of patterns to hypothetical problems. Whereas design narratives report on past experiences, scenarios present current and future challenges facing practitioners. They are used as test cases to demonstrate the validity and utility of patterns.

Design scenarios offer a suitable representation for projecting design claims into the future, posing hypothetical statements regarding potential challenges and possible solutions. They borrow the form of design narratives, adapting it from an account of documented past events to a description of imagined future ones. The context describes a current, existing situation, which is perturbed by the introduction of new material, social and intentional elements such as new technologies, new practices, or new objectives. Consequently, the challenge component may describe an existing conflict of forces, which is altered by the introduction of new contextual elements. The protagonists in a design scenario do not need to refer to specific individuals in the real world, but they must describe persons who could, convincingly be present in the domain of practice being explored and be ascribed with the intentions and social relations included in the described context.

Patterns for the Participatory Pattern Workshops methodology

The PPW methodology can be represented in its own terms, that is, as a language of pedagogical design patterns. At the heart of the methodology is the participatory pattern workshops pattern, which describes the interrelation between a series of collaborative reflection workshops, typically: a design narratives workshop, a design patterns workshop and a design scenarios workshop. These patterns are described in detail in Mor, Winters, and Warburton (2010), which includes templates for narratives and patterns, and links to exemplar presentations.

Projects

The projects through which the PPW methodology has been developed include:

- The Pattern Language Network (Planet) project (funded by JISC) which produced over 100 design narratives, close to 30 design patterns and 13 scenarios. A number of the patterns in this book were first developed in that project, and the archive of the project wiki at http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Main/ forms a valuable resource which we will reference a number of times in this book.
- The Learning Patterns project (a Jointly Executed Integrating Research Project of the Kaleidoscope Network of Excellence) produced around 25 design narratives and 150 patterns, some of which were published in Mor (2010).
- The Formative E-Assessment project FEASST (funded by JISC) produced ten patterns (Daly, Pachler, Mor & Mellar, 2010; Mor, Mellar, Pachler & Daly, 2010).
- The Mobile learning for Development (ML4D) project (funded by the Higher Education Innovation Fund) investigated ways to provide development practitioners with the capacity to design their own mobile learning activities.

– The MUVEnation project (funded by the EU) produced 28 design patterns, over 80 design narratives and more that 20 design scenarios about the use of immersive virtual worlds for learning and teaching (Warburton, 2009).
– The Rhizome project (funded by Eduserv) produced 11 design patterns and more than 25 design narratives in the domain of digital identity management (Warburton, 2010).

Future Directions

The Participatory Pattern Workshops methodology is a work in progress. How robust is the methodology described here to the constraints of particular situations? When would it be effective, and when would it be overkill? Our experience suggests that the methodology is robust and versatile. Participatory workshops are probably not the most cost-effective means of collecting and disseminating design knowledge, as any participatory process by definition is a time intensive activity. On the other hand, the workshops offer participants significant personal benefits, in terms of their professional development, and they produce outputs which reflect the social and individual knowledge assets of participants. The prospect of using and constructing design scenarios, narratives, and patterns as a framework for professional development of educators is currently being explored in the development of the Learning Design Studio model (Mor & Mogilevsky, 2012) and the emerging model of teacher led design inquiry of learning.

The work within some of the projects here, notably MUVEnation, has suggested that an online setting for collaborating in design pattern generation can be successfully used. By deploying both synchronous and asynchronous mechanisms for virtual collaboration there is an exciting potential to extend the reach of the PPW methodology, opening up design pattern generation to a wider audience. In this way we can foresee larger networks of domain experts coming together to build, share and evolve design patterns, enhancing their quality and robustness.

A key future challenge resulting from design pattern generation is the role of abstraction (Winters & Mor, 2009): how will practitioners use the PPW methodology to develop generalisable solutions from their own experiences? It will be interesting to see the how patterns presented in this book can be used and iterated upon in different contexts, at different levels of abstraction. It is only when this question in answered through pattern use that we will be able to judge the success of our endeavour.

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1. LEARNER CENTRED DESIGN - OVERVIEW

New technologies and high user adoption rates are pushing developers of social and educational tools to unprecedented productivity rates. When a teacher plans to employ these new tools and technologies, he/she will find an abundance of uses and design options. This has resulted in the teacher's design task becoming increasingly complex.

While installing and using new tools are simple tasks, the real challenge lies in finding the value-added ways of integrating cutting-edge tools and methods in educational practice. Without a sound pedagogic base to build upon, the selection and use of tools will merely create an online mirror image of what we already know from 'traditional' teaching and learning - a grim image which shows all lines of control tied to the teacher and the resources he/she provides. One pedagogic approach that may guide decision making in a complex, multi-faceted, and continuously evolving environment is the learner-centred approach. In a learner-centred educational environment, the ultimate goal of the designer/teacher is to put the learner and his/her learning process at the centre of every decision during design and delivery.

How can this be achieved? Clearly, this means catering for diverse learner needs and characteristics, provision of a setting of authenticity and inclusion, openness to experience and personal growth, co-creation of knowledge, and personal regard for each individual. The main goal is to facilitate learners in becoming active, self-directed and self-responsible **participants** in the learning process, in which peers and the instructor serve as facilitators, motivators and personal resources. From a teaching and design perspective, this is a very complex and demanding endeavour. As an entry aid for interested practitioners, this section includes five patterns and accompanying design narratives which offer handy pieces of advice in helping them move towards a learner-centred mindset.

The pattern INTERACTIVE LECTURE MODE (1.2.1), along with its accompanying design narrative (1.1.1), addresses the learners in the potentially least learner-centred of all educational experiences: the lecture. Even within this teacher-directed and inactive learning context there is room to support self-directed, deep and meaningful learning. The pattern helps the design and implementation of an interactive mode of lecturing in academic courses by including a complementary strand of activities, in which students team up to solve problems of practical and personal relevance related to the subject of the lecture. They are supported by interactive virtual team spaces and an electronic diary (or e-portfolio) service. They are offered room for exploration and personal as well as interpersonal reflection. The pattern and the

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 13–16.

design narrative embody many core principles of learner-centred design, making it a demanding, yet potentially highly rewarding experience. Learners are going through a process of constructing meaning from information and experience. They pursue personally relevant goals by engaging in a self-chosen topic, and they are guided towards strategic, higher-order thinking since they are reflecting on their learning process. They are intensively facilitated in their complex problem solving processes, in which they work in teams and thus also experience social influences on learning by interacting, negotiating and communicating. Last, but not least, they are stakeholders in the process by co-determining the goals and assessment criteria for their projects.

Whatever the predominant teaching mode on a course, the pattern SPOTLIGHTING LEARNING PROCESSES (1.2.2) can be used to promote a similar kind of student learning community. This pattern takes advantage of the availability of blogging tools on the web, the use of which is embedded into the course environment, as in the lab course in which students work both individually and in teams described in the design narrative 'Lab Course on Software Architectures and Web Technologies' (1.1.2).

The advantage for the tutor is that this published account is a means to track each student's, or each group's, developing thinking, their conceptual difficulties, and their approaches to the plans and problems they confront as they carry out their independent work on the course. The advantage for the student is that, being published on the course site, their accounts are accessible to other students, so they can see what others are doing to tackle similar problems, give and receive comments, and also receive on-going formative advice from the tutor. The challenge is to make this potentially rich exchange happen, and the pattern offers guidance on how to set up and encourage this regular and productive exchange of ideas, problems and solutions.

The products of blogs are also valuable because they can be used to populate e-portfolios, which offer a more structured way of tracking student progress. They could also be used for the pattern SHOWCASE LEARNING (1.2.3). The aim of this pattern is to celebrate the output from student learning because the products that students create as part of their coursework assessment are typically seen only by the marker, and yet in many cases they represent a great deal of work, and are of great interest to other students who have been grappling with the same kind of assignment. As in the case of blogs, however, it is not just the product that is of value, but the process as well, and this pattern emphasises the value not just of showcasing final products but also of the failed attempts along the way from which the student learned. Products can take many forms – material, digital, performances or events. The pattern addresses the issues of planning and logistics, as well as the potentially difficult issues of diversity and inclusion.

The pattern REACTION SHEETS (1.2.4) presents a useful activity that can be employed as a companion in virtually all courses. Students are encouraged to reflect on the course units and share their reflections (i.e. the reaction sheets) with the facilitator and with peers. The idea is to solicit honest feedback on the current state of the course.

The reactions are considered as input to the following course unit, thus empowering students to co-shape the process. The power of this pattern is that it is fairly easy to include, yet highly powerful in shaping a community of learners and teachers. By considering and hearing learners as individuals with their own meanings, opinions and creative power, 'reaction sheets' can be a truly learner-centred add-on to every course.

The pattern ACADEMIC WRITING SKILLS (1.2.5) has a somewhat different flavour from the first four patterns. It addresses students with a non-native speaking background who have language difficulties in academic writing for specific subjects. The pattern is derived from a design narrative (1.1.5) in which non-English speaking background (NESB) students are facilitated in developing skills enabling them to write well-formulated use cases for computer science projects. The pattern proposes a genre-based approach to help students understand the nature and type of text they are writing. From a learner-centred perspective the pattern strongly addresses factors of individual difference in student learning by acknowledging that language, ethnicity and other cultural aspects affect learning, and that learners' achievements and motivation are enhanced when their linguistic, cultural and social backgrounds are taken into account.

The pattern CONTENT MORPH (1.2.6) is different again. The pattern is designed for teachers to use so that they can capitalise on a learner-centred learning activity that takes the form of a game, and transfer its design to different topic areas, thereby increasing the value of the original design. The replacement of topic content in a game format is risky because the internal relationships between the objectives, the activities and decisions made in the game, and the structure of the topic content must be preserved when the new content is inserted. This pattern provides the means by which the appropriate transfer of content can be assured. The design narrative from which this pattern is derived describes a mathematical game for a particular problem, but shows that the design of the game is suitable also for a different topic area with the same problem structure. For teachers who wish to develop further student-oriented applications from an effective original the pattern provides useful guidelines on how to do this in a way that does not distort the structure and design of the original educational game idea.

The six patterns are highly diverse in terms of how they are embedded into learning and teaching. The INTERACTIVE LECTURE MODE pattern can potentially be used to design a full course for a whole semester. Both SPOTLIGHTING LEARNING PROCESSES and SHOWCASE LEARNING could be used as adjuncts to the existing learning and teaching activities in a course. THE REACTION SHEETS pattern is more meant as a companion activity to the course's core learning and teaching activities. The ACADEMIC WRITING SKILLS pattern focuses particularly on the learners' individual backgrounds and is most powerful in multi-cultural and multi-lingual settings, which are becoming increasingly prevalent in a globalised educational and corporate world. Finally, the CONTENT MORPH pattern focuses on enabling teachers and researchers to transfer good educational ideas for student-oriented designs across topic areas.

Readers who are interested in reading more about the psychological underpinnings of learner-centred education are referred to McCombs and Miller (2006) and Rogers (1983).

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1.1.1 DESIGN NARRATIVE: INTERACTIVE LECTURE MODE OF THE HUMAN-COMPUTER INTERACTION LECTURE

SUMMARY

This design narrative provides the source for the pattern interactive lecture mode. It illustrates the implementation of the INTERACTIVE LECTURE MODE pattern in a Human-Computer Interaction lecture course which was part of an undergraduate study program at the University of Vienna. Students could choose one of the two possible 'modes' of the lecture, the 'traditional' lecture including regular oral presentations held by the instructor and a final written exam, and the 'interactive' lecture mode including the completion and documentation of a team project, keeping an electronic diary and a final oral presentation. In order to improve their grades (towards A – very good, or B – good), students who participated in the interactive lecture mode could take the final written exam if they wished to do so.

SITUATION

The Human-Computer Interaction lecture was a course of the bachelor curriculum of Computer Science, offered at the University of Vienna. Additional to a laboratory course on Human-Computer Interaction assigned with two ECTS (European Credit Transfer and Accreditation System) points, the lecture was offered as a course with four ECTS credit points taught in three hours per week during one semester. Frontal teaching for three hours per week offered potential for including activities in which students could be engaged and involved with other activities that support deeper learning and continual feedback.

TASK

The task was to offer an option for students who wanted to actively engage in the subject matter and who wanted to receive continuous feedback on how they were doing during the semester. This learning opportunity or lecture mode should be linked with the 'conventional' lecture mode ending with a final exam. The conventional lecture mode took place in the same course and was offered to students not interested in active participation in the course during the semester.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 17–21.

ACTIONS

At the beginning of the lecture, students had to sign up for the interactive lecture mode. The course was supported by the learning environment CEWebS (Cooperative Environment Web Services) which offered a blog as an extended functionality in order to enable writing online diary entries. CEWebS provided team spaces as well, where teams could upload their contributions and peer-evaluate contributions of other participants or teams. In a wiki module contributions could be collaboratively elaborated. Another CEWebS function allowed the development and collection of questionnaires, which enabled online self-evaluations by means of writing statements and grading one's own learning achievements (Mangler & Derntl, 2004).

Students were asked to build teams with a maximum of three members per team and to elaborate team project proposals. Students were asked to briefly describe the topic of their project, their motivation and the context, as well as the intended goals of the project in their project proposals. Furthermore, students were asked to describe the way the team wished to solve the identified problem, the intended outcomes of the project, the allocation of resources and a rough schedule of the activities necessary for the successful completion of the project. Criteria for the team project were:

- The team project illustrates an in-depth elaboration of one or more core topics of Human-Computer Interaction and Psychology as presented in the lectures.
- The team project follows clearly defined objectives.
- The team project includes a literature review, as well as practical examples and illustrations of their own experiences that support and/or critically question theories.

The team project proposals were reviewed and assigned by a tutor. During the team project work phase, three work-in-progress inspections of particular project contributions were done by the tutor. In the last unit of the lecture, students presented their team projects. The aim of the presentations was to provide some insight into the topics and results elaborated by the participants of the interactive lecture mode to other students of the course. These presentations were addressed to all students, including those who did not participate in the interactive lecture mode. Furthermore, participants of the interactive lecture mode regularly wrote entries into their electronic diaries. They were instructed to adhere to four e-portfolio phases (Peterson et al., 2007): personal state of knowledge and experiences, continuous reflection, experiences collected in the team project and in the lecture, and final reflection. They could decide whether they allowed read permission for all participants of the course or only for the instructor. We suggested to our students that they write about 100-300 words per entry and that they not spend more than one hour per week on this activity. As an incentive to participate in the interactive lecture mode, participants could achieve in the best case the grade C (satisfactory) without final written examination. In order to improve their grade (to B – good, or A – very good) students had to pass the final written exam. The points were added to the points collected in the interactive lecture mode. Students who did not participate in the interactive lecture mode took

the final written exam at the end of the lecture but had no additional points. Figure 1 presents a flowchart of the students' activities of the interactive lecture mode as conducted in the Human-Computer Interaction and Psychology course.

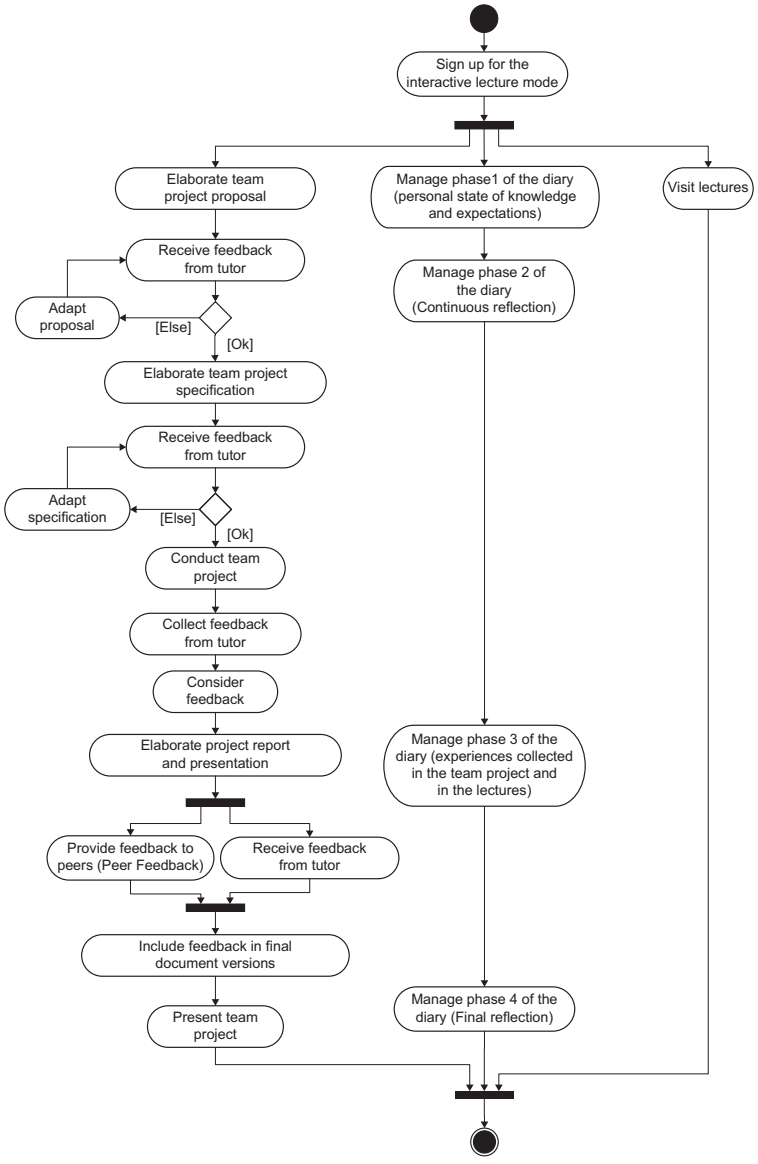

Figure 1. Students' activities of the interactive lecture mode as conducted in the Human-Computer Interaction and Psychology course.

RESULTS

In summer term 2008, 116 students participated in this course and 31 of these students signed up for the interactive lecture mode. 74% of the participants in the interactive lecture mode successfully passed the course. Empirical findings which resulted from a qualitative content analysis of students' reflections on the course are summarized in Kabicher, Kriglstein, Figl and Motschnig (2008). It was found that students often expressed a positive attitude to Human-Computer Interaction (44 statements) and some of the statements referred to the interactive mode (26 statements), particularly to learning, time requirements and grading. Students explained, for example, that the interactive mode:

– offered them the possibility to learn the subject more effectively (12 statements)
– required more work than the 'traditional' lecture with a final examination (8 statements)
– was not graded clearly or fairly enough (6 statements).

LESSONS LEARNED

We learned from the experience and the feedback of our students participating in the interactive lecture mode that we could offer them the possibility of learning the subject matter more effectively, but that the interactive lecture mode asked for more work to be done than seemed to be necessary in the conventional lecture with one final exam. Furthermore, we learned that the grading and assessment modes of the interactive lecture mode need to be clearly communicated, offering an incentive for students to participate in it. We also learned that legal regulations may make it necessary to integrate the final exam as a requirement into the interactive lecture mode.

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1.1.2 DESIGN NARRATIVE: LAB COURSE ON SOFTWARE ARCHITECTURES AND WEB TECHNOLOGIES

SUMMARY

In a computer-science lab course on software architectures and web technologies I tried to introduce student blogs as an opportunity to attain deeper insight into individual and team learning processes and to provide improved support and facilitation of learners during the online phases of the course. The research activities around this project were supported by the 'Technology Enhanced Learning' project funded by the University of Vienna (See http://elearn.pri.univie.ac.at/projects/tel/).

SITUATION

This was a third-semester undergraduate lab course on software architecture and web technologies, held at the Faculty of Computer Science, University of Vienna.

The lab course was provided in a blended learning mode, with face-to-face lab meetings serving as a plenum for assigning tasks, doing hands-on exercises, discussing contributions, solving task and project related problems, checking assignments, and presenting team project results. The lab course started two weeks into the semester with two-hour face-to-face meetings held (almost) every week thereafter. The student workload for the whole module (lab course plus lecture course) was about 10 hours per week.

Students had to complete a number of individual assignments as well as team-project tasks during the online phases of the lab course. They were also active during in-class exercises, presentations and discussions, but most of the learning activities took place at a distance with the support of a learning management system.

TASK

As one of the lab course instructors, I was always dissatisfied with the fact that I did not really know how students were approaching the assignments and the team project work, or what they experienced during that work (e.g. problems encountered, dead-ends, alternative solutions, decision processes, teamwork issues). This was because most of the work was carried out outside of the computer lab. The computer lab was merely a face-to-face synchronization of individual and team learning paths,

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 23–30.

which were not at all transparent to me. My main problem was that I saw the product of their work, but had no insight into the processes. Occasionally a discussion board posting would shed some light onto particular problems encountered, but this was not a very rich source of insight.

My belief is that the learning process is equally or even more important than the outcome, so I felt a growing dissatisfaction with the situation and felt that I had to do something about it. The aim was to provide students with a means of expressing their meanings, problems, and solutions, while at the same time providing me with a means of 'monitoring' and facilitating their learning activities.

ACTIONS

My idea was to have students document their efforts in contributing online and face-to-face in their personal blog. Blogging was intended as a kind of personal journal: it should offer the students some space for posting insights, reflections and comments on the assignments and tasks (e.g. why they were unable to solve a problem), reflection on their project teamwork, and anything else they may consider worthwhile to mention. I gave them the following piece of guidance for using the blogging tool, both verbally and on the e-learning system:

> Use your blog to reflect on your problems, insights, and contributions during and after your task-related activities (project work, individual tasks) for the lab course. For example, you could ask yourself the following questions: What causes/caused me problems (and why)? Which solutions have I found/tried that could also be useful for my colleagues? Where was I unable to find a solution (and why)? What am I contributing to the team project? How do/did I approach the current problem? The minimum requirement is one blog entry per person per assigned task.

The blogs were hosted on Blogger, a free blog hosting service offered by Google (http://blogger.com/). Thus, the blogs were accessible publicly by everyone on the web. The problem of integrating the blogging activities into the course's learning management system (LMS) was approached by implementing a custom module as an extension to the LMS, which served students and instructors as an entry point to blogging activities. The module produced an LMS page comprising several pieces of information (see screenshot below):

- The blogging guidelines as given above.
- A link to their own blog on Blogger as well as to the instructor's blog. At the beginning of the lab course students were asked to create a personal blog on Blogger and to submit their username to their instructor.
- A bullet list of the 20 most recent blog entries, including title, author, date, and number of comments. This list was automatically updated every three hours by parsing and transforming the RSS feeds available on Blogger for each blog.

– A list of links to all student blogs. It was possible to assign a rating to each blog (1 to 5 stars) right next to the blog link. This rating, and a list of top bloggers, was also listed on the page in the form of top-10 charts. The idea underlying the rating option was to stimulate blogging activity, and to reward frequent and popular bloggers with presence on the blog page.

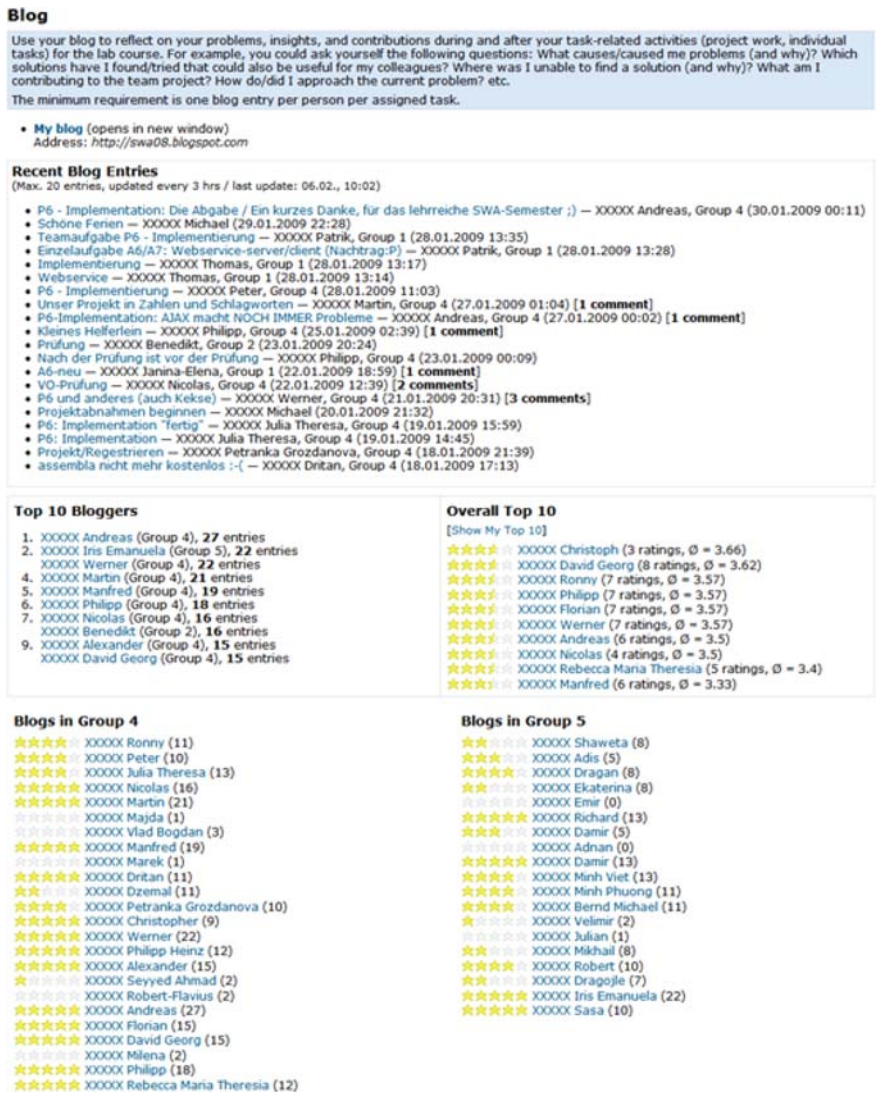

Figure 1. Integrating the blogs in the Learning Management System.

Note that it would have been possible to use any of the freely available RSS feed readers on the web (e.g. Google Reader at that time) as the blog portal, but I wanted to have better control over the appearance and usability of the feeds, and I wanted the feeds to be integrated into our LMS. Blogger was my first choice of blog hosting service because it is one of the most popular and feature-rich services but the blogs could have been hosted on any other blog hosting service that is free of charge.

During the semester, I tried to spark and sustain blogging activities by taking the following support actions:

- First of all, I took some time *every* morning to read *all* new blog entries.
- I regularly updated my instructor blog (http://swa08.blogspot.com/). I tried not to overwhelm student bloggers with my rants, so I figured that about one or two blog entries per week should do it.
- I frequently commented on student blog entries, looking to encourage exploration, compliment good contributions, ask open-ended questions, and encourage peer interaction.
- In the face-to-face lab meetings I frequently referred to issues raised in student blogs. This was intended to help the students to understand that blogging activities do have an effect on face-to-face actions.

RESULTS

To provide some orientation, here are some quick facts about the bloggers:

- I had 43 students in two course groups (the split groups were due to computer lab size restrictions).
- About one-third of the students already had prior experience with keeping a blog, while another 40% of them only had experience with reading other blogs.
- A handful of my students had no idea what a blog actually was.
- Each student posted an average of close to ten blog entries over the whole semester.
- An average entry had slightly more than 800 characters, i.e. the length of a typical text paragraph.
- Almost 250 comments were posted to the course blogosphere.

Given what I wanted to achieve by introducing student blogs, the experience was a great success: engaging in the course blogosphere by reading, commenting and posting was a highly enjoyable experience. Even though some students obviously posted to their blog only to avoid having an empty blog, there were a considerable number of students who did seize the opportunity of being able to voice their problems, solutions, thoughts and insights:

- Informal learning communities emerged through groups of students frequently posting comments to their peers' blogs to support each other, and also to engage in off-topic conversations.

– The blogs offered rich sources of insight into student learning processes. Students frequently reported in detail on how they tried to solve the given assignments, describing the problems they encountered, explaining and sometimes 'showing off' the solutions they came up with, but also the struggles with teammates, deadlines, and other courses.
– The issues raised in the blogs helped me identify frequently occurring obstacles encountered during assignments before those assignments were due to be discussed and presented in class. This proved to be valuable input to upcoming face-to-face lab meetings.
– The students used all sorts of fancy gadgets offered by Blogger, e.g. widgets that enable embedding to-do lists, friend lists, personal information, and web bookmarks, into their blog page.

Figure 2 shows a screenshot of one of the student blogs. The example blog entry that is shown deals with problems in finding the 'right' level of abstraction when modelling the architecture and design of a piece of software to be built. Brief and simple entries like this one helped me greatly by revealing specific problems the students had when solving their assignments. Also, the brief comment I left there might have helped other students to see that it is not only the solution that counts, but that I value the path to the solution as well.

LESSONS LEARNED

Insights into learning processes

The blogs offered valuable, sometimes unexpected, insights into how students approach and perceive the tasks given to them and on the distribution of work amongst members of a team. I was able to draw different kinds of insights, e.g.:

– Ups and downs during working in a team.
– From journal-like postings on time spent on and problems encountered during assignments, I was able to gain insight into the amount of time and work required for solving the problems.
– Bloggers who posted solutions to unexpected problems that they encountered during their tasks and the resources they discovered on the web during their search for solutions provided hints to the most difficult stages in the problem-solving processes for them. Consequently, I was able to dedicate some time to addressing these issues in subsequent lab meetings.
– The process of creating a solution should be considered with equal weight to the outcome; but it often turns out to be difficult to estimate the effort a student puts into finding a solution or remedy by assessing the outcome only. Blog entries explaining problems, failures, and solutions offer valuable complementary information related to the learning process.

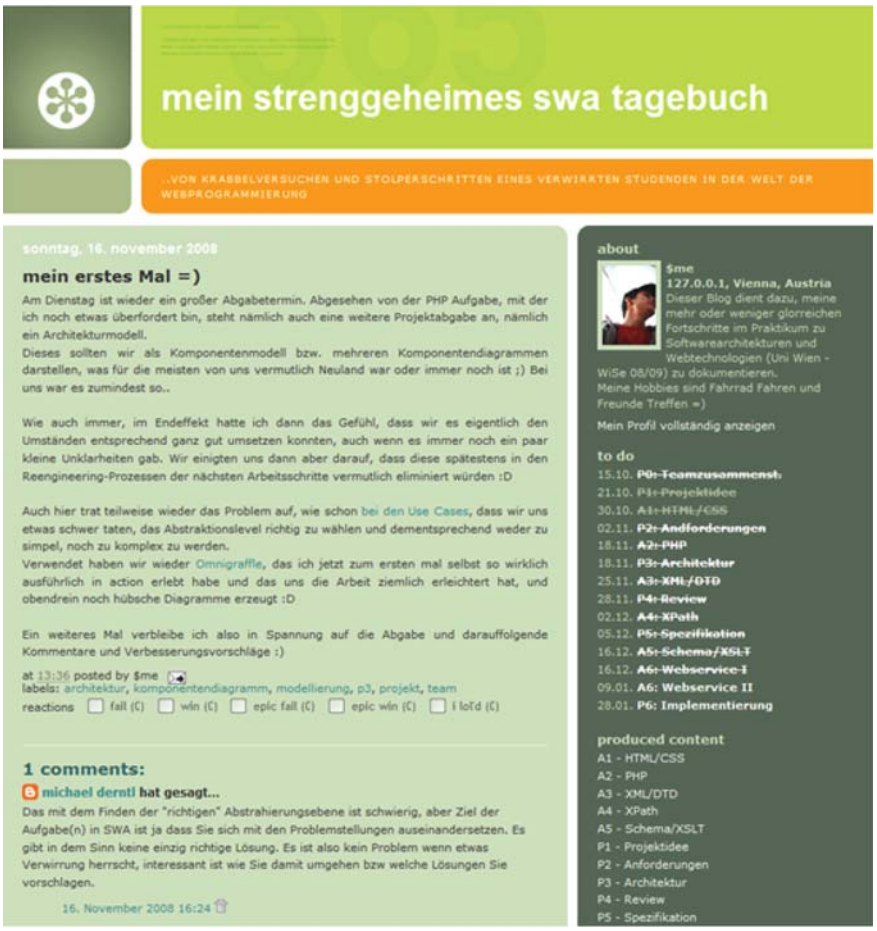

Figure 2. A student blog.

Increased responsibility

Introducing student blogs essentially adds a new communication channel for student-student and student-instructor communication; thus it also adds to the overall responsibility of the instructor. For instance, on one occasion I ran into trouble with a student who complained about his dissatisfaction with my written comments on one of his assignments. This was included in a larger blog entry, and obviously I read over that entry too quickly and missed the complaint. The motivation and the scores of this student visibly dropped in the following weeks, and I had no idea why this was the case. The issue was resolved only in one of the final lab meetings, where I eventually brought up the concern.

Increased workload

Introducing student blogs also involves additional workload for the instructor. On some days it took an unexpectedly high amount of time to read the blogs, ponder their meanings, and offer support to solve the issues raised. Blogging activity generally followed a quite ragged pattern, i.e. on some days the student community posted less than five blog entries, while on some days they fired more than thirty entries into the course blogosphere. Unfortunately, those peak days were typically located close to upcoming lab meetings, where I had to prepare the meetings and check the assignments. So I had to adapt my weekly routine by reserving a couple of hours before each lab meeting to deal with unexpected issues emerging from the blogs. Note that having the support of a tutor would be very helpful here.

Communicating blogging requirements

From feedback and discussions during the first face-to-face meetings, I discovered that students were initially not sure what content they were 'supposed' to post to their blogs, so I sought to explain and clarify my requirements and expectations on multiple occasions, particularly during the first couple of weeks.

Motivating bloggers

While some students seemed to have an intrinsic motivation and enjoyed experimenting with blogs, others seemed less eager to use this tool. Telling those reluctant students to contribute more to the blogosphere was not really successful: the blog entries they posted after being 'pushed' to blog often did not include any meaningful information or contribution. However, the vast majority of my students were open and positive about this novel experience.

REFERENCES

More details about studies in two different years, along with specific research questions and findings, can be found in the following publications:

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1.1.3 DESIGN NARRATIVE: STAR OF THE WEEK

SUMMARY

This design narrative is about motivating first year students by showcasing good student work every week to the class.

SITUATION

A large class (138) of first and second year computer science students on a programming module called Interactive Systems. The students' assignment was to create a virtual pet in Second Life. This involves 3D modelling and programming skills.

TASK

The general problem is how to engage first year students: to motivate them with their learning and encourage them to continue with their studies when they find it difficult. The intended effect was to engage and motivate the students, by showing examples of good work which others could learn from, and showing students their work is valued, and also to build a sense of community.

ACTIONS

The approach was to introduce Creature of the Week (this could be generalised to Star of the Week for other projects). This means that I select a virtual pet from the Second Life island every week, take a screen shot of it, and then display that screenshot at the start of every lecture. It also goes on the class blog in the VLE for the module. Sometimes there are runner-up creatures. Sometimes I do a live demo of the creatures in SL to show interactive behaviour. Sometimes I pick creatures which display particular techniques we have been learning about. Sometimes I just pick them because they appeal to me.

In a similar vein, there was a Virtual Crufts at the end of semester where peer nominated creatures got prizes. This is based on previous modules I have taught where we have had Multimedia Oscar ceremonies.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 31–33.

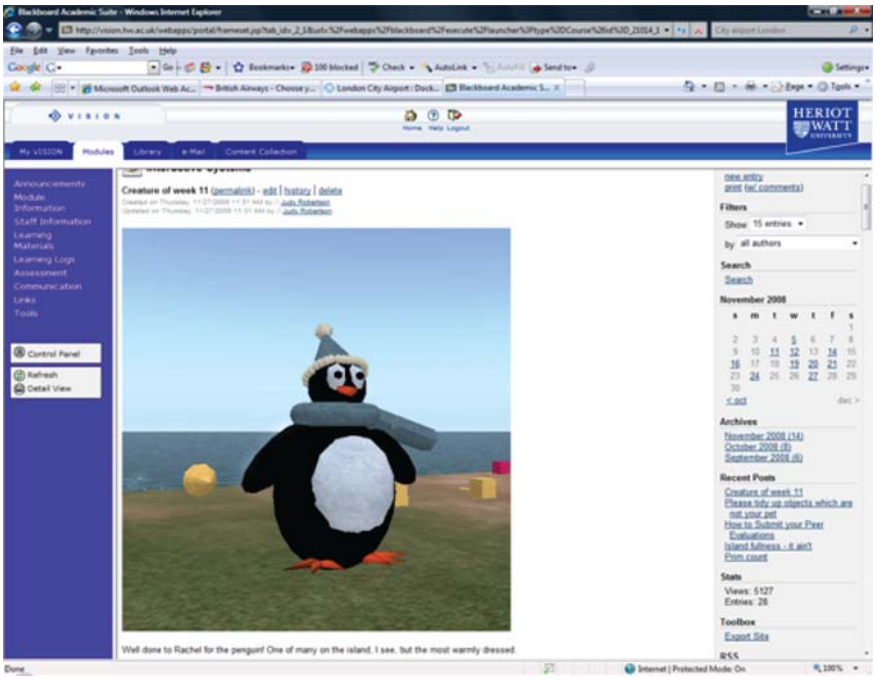

Figure 1. A Creature of the Week.

RESULTS

It is quite hard to measure the impact of this alone, but it seems to be well received. The lecture audience seem to like seeing the creatures, and the owner of the creature often looks sheepishly proud. Sometimes students tell me someone's pet should be Creature of the Week; sometimes they tell me theirs should be Creature of the Week. They also often point out good examples they have seen which have not been showcased. Some of the students wrote in their learning logs about being inspired by seeing other students' work and how they aimed to do as well. One student said he didn't like Creature of the Week because he thought it was 'demeaning' for students who weren't picked. 'Demoralising' is perhaps a better word. A result which should not be discounted: I like doing it. It's fun. Lecturers need to have positive experiences just as much as their students!

LESSONS LEARNED

I might do this more systematically next year, trying to show more examples of good technical work. But I think it is a reasonable, light weight, way of trying to create a fun class community. It works because the assignment is about something

visual, and because the project is ongoing for 12 weeks. You might get occasional students who have social difficulties which mean they really hate to have their work publically displayed. It might be a good idea to mention you are going to do Star or the Week at the start of semester and let anyone who is horrified by the notion approach you then.

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1.1.4 DESIGN NARRATIVE: ESTABLISHING A CONSTRUCTIVE ATMOSPHERE IN CLASS IN WHICH CREATIVITY AND COOPERATION ARE WELCOME

SUMMARY

An initial challenge in courses that aim at rich learning from interaction is to establish a constructive atmosphere in class. One step in this process is to include students in their learning, for example by fine-tuning the learning outcomes based on students' expectations or by respecting the students' feedback on course units in the design of follow-up units. A simple but powerful tool for student inclusion is reaction sheets, submitted online, read by the cohort and discussed in class. If the multiple perspectives are addressed and honoured, students tend to open up and benefit from sharing.

SITUATION

The courses are held in a blended learning mode. They have the following (or similar) learning goals among their generic learning objectives:

- Participants acquire personal experience, skills, and develop facilitative interpersonal attitudes in situations of professional and everyday communication (such as listening, articulating, speaking in a group, conflict resolution, decision making).
- Participants build a learning community around the course's subject matter including a concern for better communication and understanding.
- Participants experience active listening and develop their own attitude towards it, become more sensitive and open to their own experience and loosen preconceived, rigidly held constructs.
- Participants move from more stereotyped behaviour and facades to more personal expressiveness and better understanding of themselves and others.
  (The term 'participants' here is intended to include both students and facilitators.)

TASK

Motivation

A major task is to motivate students to share their thoughts, feelings, meanings, concerns, etc. in an open but equally constructive and valuing way. A precondition

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 35–40.

is to establish a safe and facilitative climate in class and to be able to 'listen to the students' voices'. If this is accomplished it is more likely that instruction or facilitation can be done in a way that is most suitable for the concrete community of learners under the particular given circumstances.

Expressing personal reactions

In courses in which individual units are organized as a series of workshops of three hours or more, students are encouraged to cooperate actively on small tasks and afterwards to share their reactions with the facilitator and with peers. The purpose of sharing reactions is manifold: students are encouraged to reflect on their learning experience and at the same they learn to express their perceptions and thoughts in a written form. Subsequently, they get the possibility to read their colleagues' reaction and through that broaden their perspectives. They may, for example, read that while they were bored by a particular exercise their colleagues considered this same exercise as a rich source for learning. For facilitators, students' reactions can provide an honest response to the questions: 'Where am I with this particular class and how does every participant perceive the course? Is there anything that needs clarification? What is the best way to move on from where we are?'

ACTIONS

Format and process

The reactions are collected as online reaction sheets in a free form, introduced by a sentence like: 'Please share your reaction to the previous workshop, in particular, what you liked, what you did not like such that it could be improved, and what you think you take with you from the workshop.' The reaction sheets are visible to all course participants and the instructor. Students are asked to first write their reaction before reading others' reactions. This is to allow them to exploit the unique opportunity of new media, namely to share independently – without being influenced by those who voiced their opinions before one's turn. Importantly, I want to emphasize an essential issue on which the successes of reactions sheets as highly potent instrument depends: honest and open communication needs to be established in the face-to-face workshops if its appearance is sought in the written reactions. They act as mirrors of the educational process and as an educator one needs some courage to look into that mirror, since the picture it reflects becomes part of the educational process.

Introducing reaction sheets

In the first workshop, the offer of working with reaction sheets and their meaning and potential effect on follow-up course units is discussed with students and it is

explained that non-anonymous reactions are preferred so that the reaction sheets can be discussed directly in face-to-face sessions and furthermore counted as active participation amenable to consideration in the grade.

Reading and feedback

I read the reactions with much interest and excitement, discovering how students perceived the workshop unit and how this compares with my own perception. The reaction sheets are then discussed with students in the face-to-face workshops and tend to have direct effects on the workshops. For example, breaks are extended if students complain that they were too short, or the amount of exercises or explanations is increased or reduced, based on the students' feedback. Some students report they are equally interested in the reactions of their peers and, almost as a rule, the most essential learning is that students' perceptions are different. In this respect, the reaction sheets convey the different perceptions and make multiple perspective-taking explicit. They also reflect how creative solutions to authentic problems in class emerge from listening to, and mutually respecting, each other. Let us illustrate this by following three excerpts from online reaction sheets written by students participating in a course on communication and soft skills held at the Faculty of Informatics of the Masaryk University in Brno, Czech Republic. The first two excerpts were written in response to the initial course block, the third one stems from the second block.

Examples

Jana (names have been changed to preserve anonymity) writes: 'I liked the way that first block was conceived. There was a lot of discussion, but there was also theory and we played games. I expected that the whole block would be in English and I would be very hard for me to speak in English. But we discussed the topic English vs. Czech language and agreed that we try to speak in English if it would be possible, but complicated topics would be discussed in Czech. After listening to arguments, why one person wants to speak in English and on the contrary another wants to discuss complicated topics in Czech, it was easier to accept the agreement for me than if the teacher had said it without discussing it.'

Peter was open towards sharing a critical remark: 'The only issue in which I see a potential for improvement is the dynamics in discussions. Some time consuming interplays [...] were unnecessarily long. I do not know exactly how to avoid that – the only thing that comes to my mind is a larger degree of control during discussions from the side of the instructor.'

Clearly, what was appreciated by Jana, namely sharing views and discussing options, seemed like a waste of time for Peter, who wanted to get 'to the core' faster and have the facilitator exercise more control. Interestingly, although these different viewpoints were not explicitly discussed in class, in the next unit something

changed: all participants (students as well as the facilitator) were aware of the danger of discussions becoming too unwieldy and cooperated to create a better balance between discussion and topic work. This change was perceived by a number of students, including by Peter who had shared the critical remark on the dynamics of discussions after the first block. He wrote: 'In my first evaluation I mentioned that some progress still would be achievable in upcoming discussions in which the whole group participates. In the second meeting I have not observed any insufficiencies anymore and for myself I must say that I highly enjoyed all group discussions, whether in the role of 'just' a listener or that of an active participant.'

Changes occurring without planned action

Interestingly, some actions and consequent changes in the course happened through sharing observations and feelings in the reaction sheets, *without* any further controlled or even explicitly promoted action! They seem to evolve implicitly and to some degree be expressed and enacted by collective behaviour of the group. As an example consider Peter's observations as described in the Section on Examples: it seems that by voicing that he felt uncomfortable with discussions becoming too unwieldy, several others watched out for this phenomenon. In this way it could be overcome by common effort (and related experiential learning by all) rather than the instructor playing the judge to cut discussions off whenever she felt they were becoming too long.

RESULTS

Extended reflective experience by combining written and oral expression

The examples given above also illustrate the power of *mixing* or *blending* face-to-face and written online expression. By writing and reading the reactions in a peaceful moment between the course blocks, students had time to think about and feel how course elements and others' perceptions resonated with them such that they could let their own thoughts and reactions emerge and ripen for some time. Furthermore, working towards creative solutions at course level is likely to inspire students to work more creatively at the team and individual level. Despite lacking scientific proof for that, the students' outcomes from the courses tended to be clearly above average, as was sometimes observed by students in their reactions, peer and self evaluations.

Creativity

Reaction sheets include students as participants in the design of their courses. Producing these reaction sheets tends to become a creative process, involving all participants under the coordination and moderation of the instructor. In this way,

collection of ideas and perceptions is increased and juggling with course elements is encouraged, with the goal of bringing out the essence for the most meaningful learning. The reaction sheets foster creativity in leaving the locus of evaluation with the student, in encouraging freedom of expression, in that on the web everyone has equal opportunities to express themselves, irrespective of, for example, having a soft voice or being shy and thus being more likely to be overlooked in class.

Students tend to feel 'heard'.

In order to appreciate the use of reaction sheets, let us illustrate it by two more examples:

While reflecting on a course unit of a course on 'Person-Centered Communication', a student wrote: 'I liked the fact that we discussed the reaction sheets in the beginning of the course unit. This way it was possible to have a smooth transition into the next course unit. This, I must say, went very well in the last workshop.'

Another student noted: 'In the beginning of the unit we discussed the reactions. I found this quite good, because on this basis one can see that they are being considered seriously and are respected.'

LESSONS LEARNED

Transparency valued more than anonymity

Anonymous reaction sheets proved to be less useful. The facilitator and peers cannot refer back directly to the student who voiced a particular concern. Also, with anonymous reactions it is not possible to include the student's online cooperation as expressed by submitting reaction sheets into the student's grade.

Need to attend to (some) reactions

If reaction sheets are not addressed in the follow up unit, at least briefly, then students lose motivation to submit them.

Don't justify yourself too much

If criticism is voiced, it is advisable for the facilitator to accept it and not to justify himself or herself and to try to prove the opposite. This would constrain students' freedom of expression and make the whole enterprise an artificial exercise without real sparkling life.

Social interactions need time

It has proved fruitful to provide, within the course units, a climate of psychological safety and to allocate time for social interaction while discussing the reactions. In

this way, when bringing together the written expressions with the spoken words a richer repertoire of ideas for juggling and combining can be assembled and used to flow into the design of the follow up units. In the words of a student: 'I have hardly ever experienced a course in which the next unit started from where the last one ended.'

Summarizing, the web-enhanced reaction sheet offers feedback potentials that optimally complement discussion and dialog in class. Web technology provides valuable assistance in collecting and preparing reactions and comments, which would be almost impossible without technological support. The educator's way of introducing and employing reaction sheets (as well as, to a lesser degree, the students' talents in expressing themselves) largely determines the degree to which this simple but powerful concept turns out to be effective in contributing to significant learning.

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1.1.5 DESIGN NARRATIVE: A GENRE-BASED APPROACH TO THE DEVELOPMENT OF ACADEMIC WRITING SKILLS

SUMMARY

This chapter addresses first year students' language difficulties in academic writing at University. The setting for the design narrative is an Object-Oriented Software Development program. Within the genre theoretical framework, it illustrates how an academic literacy program was developed to address language issues with detailed discussion of learning difficulties, module design with specific content examples as well as the discussion of program outcomes and lessons learned. This design narrative has contributed to the knowledge of academic literacy development with a genre-based approach.

INTRODUCTION

This design narrative addresses the task of providing academic literacy support to university students. It concerns the language problems of first year university students in their written assignments. A genre-based approach was developed to help students understand the different text types of their assignments and the language features deployed by experienced writers in effective written communication.

It is very important to be aware that although the example used for this chapter is how to write a use case in Computer Science, it provides a typical example and provides an insight into the language difficulties among first year university students and is therefore valuable to most language educators. In a broader sense, the 'Situation and Lessons Learned' represent many similarities in the university context, while the 'Task and Actions' are designed to capture the core which is flexible and can be adapted to suit similar situations for different disciplinary circumstances in language literacy development.

SITUATION

The support for academic literacy development is essential for first year university students. An embedded language development program (LD) was designed by the Student Learning Unit (SLU) to help students improve their written assignments. In

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 41–47.

this case, the program was targeted at computer science students who had to write a use case as a part of their written assignment.

A use case is a collection of possible sequences of interactions between the system and its users (or actors). It consists of unambiguous descriptions and a step by step text format to allow a computerised system to translate the user's needs to achieve a desired goal, for example, race nomination acceptance for a Regatta (Box & Ferguson, 2002).

According to the comments made by lecturers, students, in particular international and other students who are non-native English writers/speakers, do not recognise the specific language genre (the staging) for writing a use case. In their writing they tend to make grammatical errors in tenses and write long and redundant sentences in their descriptions. These errors often result in misinterpretation and confusion of the sequence of interactions and consequently the computer system often fails to process the outcomes to achieve the desired goals.

The Student Learning Unit received a request from the unit coordinator to design and teach a language development program to address these writing difficulties. The task is to teach students how to write a well structured and articulated use case.

TASK

After many discussions with the course coordinator, a special language development program was designed and taught in conjunction with the Object Orientated Software Development lecturer in class.

Within the Systemic Functional Linguistics (SFL) framework (Halliday, 1993, 1994; Hassan, 1996; Lemke, 1989; Martin, 1993, 2000), the program was based on Genre theory (Martin, 2000, 2001; Swales 1990; Unsworth 2001). The program specifically focussed on:

– the understanding of language used in a social context
– text type and textual structure
– language features of descriptive and procedural texts
– grammar and sentence structure.

The aim was to provide students with an opportunity to practise language skills within the context of their discipline. Exemplars of well written use cases were used to illustrate the main ideas and specific language functions. Students learn to develop their writing skills through understanding, modelling and meaningful feedback.

ACTIONS

An embedded academic literacy program was developed to support students, in this case, students in the School of Computer Science, in writing a discipline specific discourse. As a part of the Object Orientated Software Development course, students were required to write a use case for their first assignment.

Genre theory formed the theoretical framework for the design of this program. It was used to identify the social context and purposes of a use case, its text type, textual structure and distinctive language features.

The program consisted of four modules. Each module was taught for half an hour in class time in conjunction with the course lecturer. All students were required to attend the language development program.

Module One introduced the concept of language function and social context. A discussion task was developed to help students talk about the social context and purpose of a use case. For example, group discussion included the following questions:

– What is a use case?
– Why do we need to write a use case?
– Who will read and use a use case?
– How does a use case work?

The understanding of the contextualisation of a use case helped students clarify the users' needs and situations in order to produce the sequence of interactions for the computation of desired outcomes.

Module Two introduced the concept of genre (text types) of different written assignments, for example, an essay, a report, a descriptive and a procedural text. A use case is a combination of descriptive and procedural texts. Different text has a different schematic structure and specific language features. For example, an essay has an introduction, body and conclusion. It is dominated by present tense and third person perspective (e.g. Brown suggests such and such). On the other hand, a report has an introduction, aims, method, results, discussion and recommendations. It has present tense (introduction), past tense (method section) and may use future tense for future improvement or recommendations. In a use case, there is a description and list of step by step instructions. When describing the social context and situation of a use case, distinctive use of present tense is evident. However, when writing the sequence of interactions for computation, imperative sentences are to be used. Students need to follow this textual structure and language features in their writing for this assignment.

The awareness of schematic structure and language features deployed by different text types enhances students' repertoire in the appreciation of the effective use of language choices in academic writing.

Exercises in Module Two consisted of selected model texts of different text types. Students were required to identify the different staging and language features appearing in the model texts. These activities were suitable for both group and individual work.

Module Three focused on grammar and sentence structures.

At university level, students are expected to use a variety of simple, compound and complex sentences correctly in their written assignments. In this module, selected sample texts were used for students to identify different sentence types. Students

were also given tasks to identify a noun, a verb, an adjective, an adverb, passive and active forms of verbs, etc. Separate worksheets were used for students to practise writing correct sentences with key words provided.

The grammar session focused on the correct use of single and plural nouns (e.g. nomination and nominations); noun groups (e.g. a regatta race, a nomination form); and third person present tense (e.g. the committee receives nominations in December). Different worksheets were developed to practise correct use of grammar, for example: filling in blanks by selecting the correct words from a list using multiple choice, and asking students to correct grammatical errors in texts written by previous students.

Module Four required students to combine all the knowledge learned in the three previous modules. They were given a situation to write a use case. This activity was done in class and the lecturer was able to provide instant feedback on the students' writing.

In addition to the design of the language development program, a design pattern based on Alexander's pattern languages (Alexander et al., 1977) was developed to capture this academic literacy support experience. It addressed the writing process, language features and genre approach to academic writing. The pattern was written in simple English with non-technical jargon. The pattern captured the principles of the genre theory and how it can be applied to help students develop language skills using the writing of a use case as an example. It also captured the linguistic experience and knowledge of how to construct a well structured and articulated use case. This pattern (ACADEMIC WRITING SKILLS) is presented in 1.2.5.

RESULTS

The embedded literacy program was conducted on three major campuses. One of the authors was a key Student Learning Unit lecturer at one of the campuses. There were about 30 students in the class. They were all first year students, approximately half being international and other students who are non-native English writers/speakers.

The genre approach to support discipline specific academic writing was effective. Students were able to contextualise their writing within their unit of study. In addition, example texts selected from texts written by previous students were relevant. This enabled students to make a connection between the errors in the sample texts and their own writing and helped to raise their awareness of common language errors in academic writings. Students also appreciated the opportunity to practise in class with constructive feedback on their work from either their peers or the SLU lecturer in class.

Through class observations, students gained confidence in their writing via group discussion and in class practice. Learning was achieved via understanding, group interaction, modelling, critique and individual practice. When marking students'

writing, it was noted that there was an improvement in their textual sequence and sentence structures. As a result, their use cases were written with a better structure and their descriptions of the users' needs were clearer and well articulated.

The genre-based approach to support academic writing in a specific discipline was presented at the 2004 Australian Society for Computers in Learning in Tertiary Education conference. Feedback from the audience on this approach to academic literacy support was well received and positive.

LESSONS LEARNED

Program design: The key challenge of the genre-based approach was that it required the designer to have pre-knowledge of the genre theoretical framework. In addition, the program designer needed to be familiar with different academic texts to be able to draw on specific examples to illustrate linguistic resources used by experienced writers. The designing process also required the meta-language to explain why and how language choices were made to achieve different social purposes in different text types. This should be explained in non-technical linguistic terms. While the curriculum designer had experience in designing language academic literacy programs, her knowledge of writing a use case was very limited. She borrowed two text books from the unit coordinator and attended the Object Orientated Software development lectures. This enabled her to use examples of computer text books and written assignments by previous students and to embed them in the program.

Teaching in class: In the beginning, when the students were told that they would have an embedded literacy program in their subject, there was some rejection from them. They felt they were there to learn computer programming, not to learn how to write.

Strong support from the unit coordinator and course lecturer was important in the beginning. When the students realised that their language skills would enhance the quality of their use case and communication skills with clients and project managers they started to show interest in the literacy program. It was very interesting to observe that even the course lecturer was very impressed with the concept of genre and how it was effectively used in supporting students' academic writing. He mentioned twice that even he had learned something new from the program. He said he would be able to explain to the students their writing problems by using some of the examples.

Learning outcomes: Academic literacy development is a process. For some students, in particular, students who are non-native English speakers, even though they gained confidence in writing a use case, there is a requirement for on-going support for their academic literacy skills. For some students who had problems in writing correct sentences with multiple grammatical difficulties the best solution was to give individual help through at least one to two semesters to overcome these

language difficulties. In this case it was not possible to provide such support. Online support could provide an alternative in such situations. Students were referred to various online literacy programs. The unit coordinator also made the modules and lecture PowerPoint presentations available online.

Collaboration: Conducting embedded literacy programs in Schools requires close collaboration between the unit coordinator, the SLU literacy designer and lecturer and the course lecturer. Such teamwork is rewarding and provides an opportunity to work collaboratively to enhance students' learning experience and improve learning outcomes.

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1.1.6 DESIGN NARRATIVE: CONTENT MORPH

SUMMARY

Researchers in a European project implemented an effective educational game concerning the study of sequences and wanted to develop a similar game concerning probability and the concept of randomness. This work was developed during the projects Weblabs (http://www.lkl.ac.uk/kscope/weblabs/) and Learning Patterns (http://lp.noe-kaleidoscope.org/).

SITUATION

Within the context of the Weblabs project a game was developed called 'Guess my Robot' (http://lp.noe-kaleidoscope.org/workspace/cases/guessmyrobot/) based on the ToonTalk software (http://www.toontalk.com/). ToonTalk is a programming environment designed for educational purposes where users "train" robots to perform tasks such as producing number sequences, and to collect a finite number of elements of the produced sequence in a container (called Box) that can be sent, via the internet, to other users of the software. A user receiving the box can look at the sequence of numbers and try to guess how the sequence was produced, he/she can then try to program a robot to produce the same sequence and send the robot as a response to the challenge. The first user receives the new robot and compares the sequence of numbers it produces with the sequence of numbers produced by his/her own robot. Following this idea in Weblabs a game was set up where pupils challenged other pupils to guess their own robots. This was very successful in stimulating pupils to reflect and to discuss concepts such as equivalence between number sequences, and different procedures that may produce the same sequence.

Within the same project the research team at the Istituto per le Tecnologie Didattiche (ITD) in Geneva was focusing on probability and randomness. Pupils were introduced to probability and randomness which was addressed through a sequence of activities based on LEGO robots serving as practical experiences on which to build the concept of probability. The researchers interpreted probability as theory concerning random events, and thus believed it was necessary for pupils to move away from the tangibility of LEGO robots toward a semiotic system closer to the mathematical one which could serve as a bridge towards the development of a mathematical theory of probability. ToonTalk could serve as such a semiotic system, being at the same time both playful and mathematical.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 49–53.

TASK

To develop a game similar to ‘Guess my Robot’ which could be used to introduce students to probability.

ACTIONS

Three main kinds of action were carried out:

– A discussion/study of the ‘Guess my Robot’ experience aimed at finding the key elements of the game which were effective from an educational point of view with respect to the addressed mathematical contents: this was done both by retrieving relevant information from the team that performed the activity (both oral presentation and written reports) and by means of ITD teams’ brainstorming like meetings.
– A historical/epistemological study of the new mathematical content, namely probability, aimed at identifying key aspects of the content to be addressed by means of the new game: this was done by reviewing relevant literature and by means of ITD teams’ brainstorming like meetings.
– A comparison of the results of the two studies in order to see if key elements of the game could be matched with key aspects of the addressed mathematical contents. This comparison corresponds to a study of feasibility.

According to the first study some structural, and effective, elements of the game were identified (to help readability we name the challenging player as player A, and the challenged player as player B, thus player B has to guess the robot created by player A to produce the sequence of numbers sent by A to B):

– Playful and competitive context based on the idea of challenge.
– Player A had to create a robot which is able to produce a sequence that it is difficult to guess. Such a robot is the computational correspondence of a formula/procedure producing the sequence.
– Player A had to send a ‘product’ (the box containing the sequence of numbers produced) to player B.
– Player B had to analyse the received ‘product’ (the box) in order to guess what kind of robot could have produced it.
– Player B had to respond by sending back a new robot which could replicate the product (namely the sequence of numbers) produced by the robot used by player A.
– The fact that the idea of equivalence was strictly connected with a key rule of the game which was deliberately left unclear. Many different robots can replicate a given number sequence, so it had to be to decided whether in order to consider a response as a good guess, the proposed robot needed to be exactly identical to the original one, or if it is enough that it is able to produce the same sequence as the original one. In the ‘Guess my robot’ experience this was left open and this choice

caused pupils to start a discussion which led them to a concept of equivalence of number sequences.

– Player B, in order to guess, might need to ask player A to provide more numbers. In a sense, the bigger the set of numbers sent from A to B, the easier it might be for B to guess the robot.

In order to design the new game it was thus first of all necessary to design computational objects which could play the roles of the robots, to produce something relevant to probability and which could be contained in boxes.

Following the historical/epistemological study ITD identified sample spaces, and sequences of items randomly picked from sample spaces, as the key elements for addressing probability. A sample space is a set of objects which can be picked randomly. Thus using ToonTalk a computational object was designed called Random Garden which is simply a green rectangle where a user can put any object available in ToonTalk (it could be a flower, a tree, numbers, text, etc.); once a garden has been set up and filled with objects, the user can give a number to a specific ToonTalk bird which will fly into the garden and come back with a box containing a corresponding number of copies of objects randomly picked from the garden, in other words a sequence of extractions from the sample space.

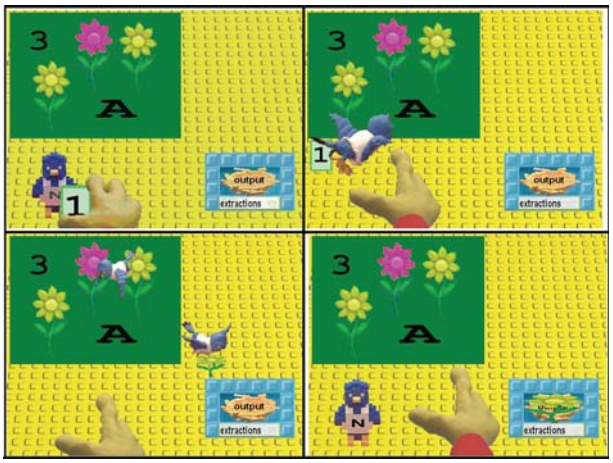

Figure 1. Random Garden.

It was thus possible to think of a ‘Guess my Garden’ game: challenger A sets up a garden and sends B a set of objects (contained in a box) extracted from such garden; player B has to guess what garden produced the received box and sends a garden as a response to the challenge.

ITD matched the above key elements of the ‘Guess my robot’ game with the results of the study of the concept of probability, trying to design and study the feasibility of the new game:

– Playful and competitive context based on the idea of challenge: this would have been granted by the following issues.
– Player A creates a garden that is difficult to guess. Such a garden is the computational correspondence of a sample space producing the sequence of extractions.
– Player A sends a 'product' (the box containing the sequence of objects randomly picked from the garden) to player B.
– Player B analyses the received 'product' (the box) in order to guess what kind of garden could have produced it.
– Player B has to respond by sending back a new garden which can replicate the product produced by the robot used by player A.
– The idea of equivalence of sample spaces can be strictly connected with a key rule of the game left unclear: how to establish if B had guessed correctly or not? Many different gardens (sample spaces) can replicate a given sequence of objects, so a decision has to be made whether in order to consider a response as a good guess, it is necessary that the proposed garden has to be exactly identical to the original one, or if it is enough that it is able to produce a sequence similar to the original one. In the 'Guess my garden' game this could be left open in order to generate a discussion which might lead the students to a concept of equivalence of random gardens (thus sample spaces).
– The fact that player B, in order to guess, might need to ask player A to provide more picked objects. The bigger is the set of numbers sent from A to B, the easier it might be for B to guess the challenge. This corresponds to the law of large numbers.

The two mathematical topics are different, and this is reflected in the game. In particular, to compare two sequences of numbers is easy; they are identical if and only if the formulas/procedures (thus the robots) that produced them are algebraically equivalent. This is not true in the case of sample spaces, a given random garden (thus sample space) may produce a different sequence of objects each time, but all such sequences (if big enough) are equivalent to each other with respect to the proportions of the different objects picked from the sample space. If two thirds of the sample space consists of yellow flowers, then, if a sequence is big enough, two thirds (roughly) of the picked objects will be yellow flowers. In other words the concept of equivalence of sample spaces is strictly related with the classical definition of probability and with a probabilistic concept of equivalence of sets of objects. This certainly marked a difference with the case of the 'Guess my robot' game, but did not impede the design of the 'Guess my garden' game.

RESULTS

ITD set up the game and experimented with it successfully. We believe that success of the content morphing of the games was due mainly to:

– A good analysis of the 'Guess my robot' game, and of the history and epistemology of the concept of probability.
– The fact that both in the case of the number sequences and probability it is possible to address the concepts in terms of a mechanism to produce a sequence.
– The fact that both in the case of the number sequences and probability a key role is played by the concept of equivalence of both, sequences of produced objects, and mechanisms producing the objects.
– The fact that with ToonTalk we could actually design any kind of computational object we needed.

This experience led us to the formulation of the content morph pattern (http://lp.noe-kaleidoscope.org/workspace/patterns/Content_morph/) project which is presented in 1.2.6. More details on specific results can be found in Cerulli et al. (2007) and Pratt et al. (2009).

LESSONS LEARNED

Given an educational mathematical game, it is possible to try to identify its crucial educational elements and re-employ them to design a game addressing a different mathematical concept. In order to do that one has to distil the original game and identify what are the key elements that characterise it. At the same time one has to distil the new mathematical concept which is to be addressed in order to find if, and how, key aspects can be matched with the identified key elements of the original game. If this turns out to be possible then it is possible to 'morph' the original game to a new one addressing the new contents. This might not always be possible, in particular in our case we doubt that we could have been successful if the new considered mathematical concept did not fulfil the requirements highlighted in the results section.

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1.2.1 PATTERN: INTERACTIVE LECTURE MODE

SUMMARY

This pattern supports instructors who aspire to teach their students in a learner-centred way and to support deep and meaningful learning. The pattern helps to design and implement an interactive mode of lecture in academic courses by including (1) an electronic diary (or e-portfolio) service, (2) interactive spaces for team projects, and (3) personal as well as interpersonal reflection.

PROBLEM

Conventional lectures usually have a focus on frontal teaching. Students' achievement of the lecture's learning outcomes are measured by summative assessments, typically by means of final written or oral exams. Such a conventional lecture mode is sometimes useful, for example for students who learn best when they listen to the instructor and who enjoy the freedom of self-directed preparation for the final exam, mastering a huge range of input on their own by using their own approaches to learning. Approaches to learning may range from learning to pass the exam to learning to understand. For facilitating good learning within and beyond a course, learning environments in general and teaching and learning activities in particular need to be considered which include and engage students in the course setting (Rogers, 1983; Knight & Yorke, 2003). Formative assessment can be used to support students with continual feedback on how well they are doing, which is useful for their further learning (Knight and Yorke, 2003).

Forces

- Instructors should facilitate effective, deep, and meaningful learning in their lectures. They should encourage students to use learning activities that are most likely to achieve the intended learning outcomes, to get involved in learning, and to strengthen relationships and interaction between the instructor and the students.
- There may be ingrained ways of implementing lectures at universities which are embedded in a long-standing learning and teaching culture. There may be legal regulations as well which determine such things as the assessment mode.
- Students should understand the subject of the lecture in order to understand in general the subject studied and in particular the topics of subsequent courses.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 55–60.

CONTEXT

This pattern is applicable in academic lecture courses. We recommend the use of the pattern in a course in a higher semester (e.g. third semester and higher of an undergraduate study program) as students should be able to reflect on course units and their own learning achievements, to evaluate their own learning achievements, and to critically review their peers' contributions.

It may be necessary to check legal regulations, which may impose restrictions on the mode of assessment, number of students, etc. of lecture courses.

The availability of an online learning environment is useful to support learning activities such as keeping a diary by means of a blog, rating and writing comments for peers, and uploading task solutions in order to share them with the course participants.

SOLUTION

This pattern tries to achieve increased student freedom and responsibility, to increase students' awareness of their learning as compared to a conventional lecture (frontal teaching), and to decrease students' dependence on formal exams. It should help the application of humanistic (particularly person-centred) principles within technology enhanced learning by offering students the possibility to learn and deepen their own interests and knowledge in a particular subject area in an active and self-directed way during a lecture where usually only frontal teaching takes place (Kabicher, Kriglstein, Figl & Motschnig, 2008). The pattern includes:

- Lectures, in which core lecture topics are presented and discussed.
- Keeping a diary (also referred to as an e-portfolio), which constitutes a space for students individually or in teams to reflect on learning experiences related to the subject in general, to the lecture in particular, or other related courses, as well as beyond the context of the university in order to increase their awareness of their own learning.
- Elaboration of a team project which should offer space to learn and deepen their own interests and knowledge in a particular area.
- (Optionally) Self and/or peer evaluation, as well as a blend of formative (diary entries and team projects) and summative assessment (final written exam) in order to offer students continual feedback during the learning process.

First of all, the possible ways of passing the course need to be introduced by the instructor to the students, who then can choose one of the two lecture modes (conventional or interactive). In the conventional lectures the instructor presents and discusses relevant topics of the course with the students. Participants need not necessarily participate in the lectures unless they signed up for the INTERACTIVE LECTURE MODE. If so, students are strongly encouraged to participate in the lectures in order to be able to update their diary. Instructions need to be clearly communicated, specifying the way students' performances are measured in both modes. In order to

encourage students to join the INTERACTIVE LECTURE MODE, the goals and the purpose of the interactive lecture mode might be highlighted, namely:

- the support of students, with space for deepening core lecture topics and their own interests in the subject
- collection of their own experiences in self-initiated and guided processes
- reflection on subject-specific and personal learning
- enhancement of social interaction
- support of their own research if desired
- reduction of pressure that may arise from focused learning for the final exam by guiding students through several learning activities that lead to a particular level of achieving the course's learning outcomes.

Keeping a diary can be organized in various ways, for example in four phases as proposed by Peterson, Roemmer-Nossek and Logar (2007). The first phase asks for students' statements about their personal state of knowledge and experiences in the course's subject area. The second phase includes continuous reflection on topics discussed in the lecture and on experiences that go beyond course requirements. The third phase asks for experiences collected in the team projects and in the lecture. Questions may be 'What worked successfully in the project?', 'What do you take home with you from the course, and what not?', 'For what can you use your collected experiences from the course?' The fourth and final phase of the diary comprises a final reflection which includes the students' impressions of the diary, experiences with writing such a diary, the offered tool function, etc. After, or during, the four phases of the diary or ePortfolio, the instructor reviews students' contributions – which implies that all diary entries need to be accessible to him or her.

Furthermore, students are asked to build small teams and to elaborate project proposals. The proposals include project goals, output and a working plan and they need to be discussed, for example, in personal meetings, with the instructor until the proposal meets the requirements, expectations, desired learning goals and outcomes of both the instructor and the team. The proposal needs to be approved by both parties and from that time on the proposal should act as a learning contract between the instructor and the team. During the course the teams elaborate contributions and deliverables as stated in their learning contracts which should be continuously reviewed and commented on by the instructor (constructive feedback). If the contributions do not need to be revised, the final contributions are published on the learning environment and presented by the team. Optionally, self evaluations and/or peer evaluations can be considered as further activities. In the case of self evaluations, students evaluate their own achievements and performances. Self evaluations should help to develop reflection skills and awareness of their own criteria, strengths and weaknesses. These self evaluation activities require students to take responsibility and therefore can be seen as facilitating personal improvement and self initiated learning (Derntl, 2006; Rogers, 1983). In peer evaluations, participants (single participants or teams) evaluate particular contributions of other participants (single participants or

teams). The evaluations can be done by means of grades, bonus points, structured or unstructured comments, or any combination of these possibilities (Derntl, 2006).

At the end of the lecture the instructor evaluates students' contributions which are published within the interactive lecture mode as well as participants' learning progress by means of oral or written examinations.

Students who opted for the conventional lecture mode participate in the lectures and usually take an examination at the end of the course.

Figure 1 illustrates the sequence of activities in the interactive lecture. The green coloured nodes stand for face-to-face activities, blue coloured nodes for online activities, and rose coloured nodes for blended activities. White nodes mean that the presence mode of the activity is unspecified.

SUPPORT

Source

The source for the pattern interactive lecture mode is the design narrative 'Interactive lecture mode of the Human-Computer Interaction lecture' (1.1.1).

Supporting Cases

Other supporting cases for the pattern interactive lecture mode are not available yet. Nevertheless, its component patterns LEARNING CONTRACTS and DIARIES were used in other course types, mainly in laboratory courses.

Theoretical justification

The PATTERN INTERACTIVE LECTURE mode is based on the 'Person-Centred e-Learning' approach, which is a blended learning approach based on humanistic educational principles (Derntl, 2006). All the activities facilitate freedom and self-initiated learning according to the humanistic, person-centred, approach proposed by Rogers (1983). The pattern includes learning contracts which consider:

- learning achievements in team projects. In team projects students can define and follow their own learning plans and targets with a high degree of responsibility for their own learning, they can – in a self-directive way – elaborate topics within a given framework in which they are truly interested and thus deepen their knowledge in a particular aspect of the course.
- reflection on their own learning achievements in electronic diaries (or e-portfolios) which can be inspired by particular questions. Diaries or e-portfolios are used for the reflection on students' learning process (Sherman, 2006). Reflective diaries support students in documenting and observing their own learning development and so in meeting their learning goals.
- self and peer evaluation activities (which are optionally considered).

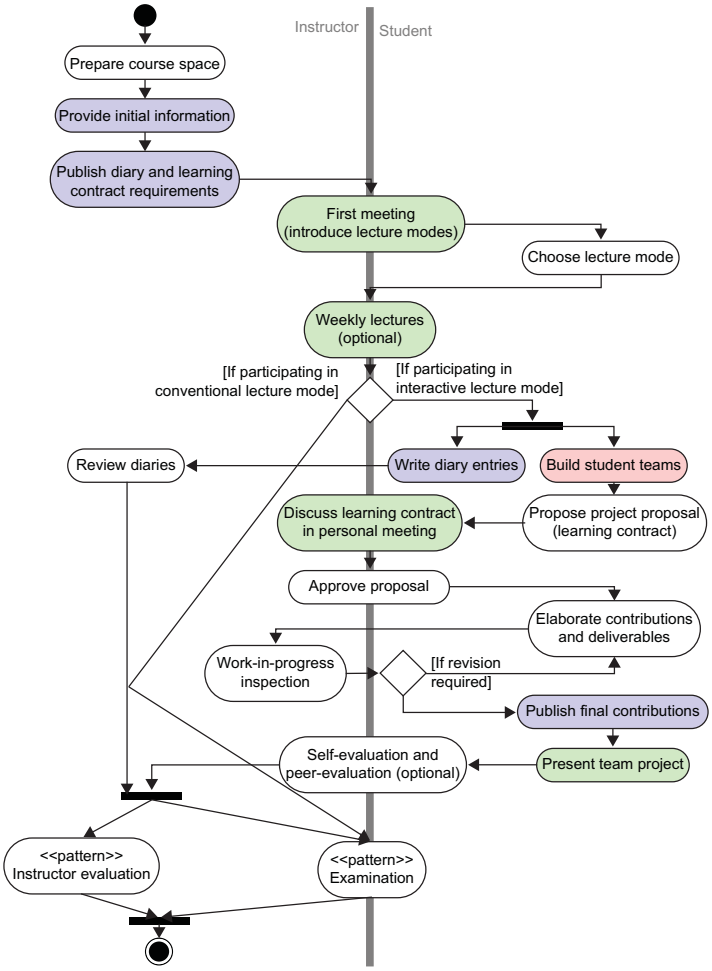

Figure 1. Activities of the interactive lecture mode visualized with coUML (Derntl, 2006).

RELATED PATTERNS

Includes patterns: LEARNING CONTRACTS, DIARY
Uses patterns: INSTRUCTOR EVALUATION, EXAMINATION, SELF-EVALUATION, PEER-EVALUATION
(These patterns are described in Derntl, 2006.)

NOTES

Liabilities: it is important to first check legal regulations regarding lecture courses before the pattern is used. It may be possible, that for example the assessment mode

of lectures is restricted to oral or written examination, which implies that alternative assessments like diaries/e-portfolios and team projects are not legally valid.

Potential risks: if the interactive lecture mode is offered without incentives for students (grades, bonus points, etc.) the interest and motivation to sign up and participate in such a lecture mode may be marginal.

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1.2.2 PATTERN: SPOTLIGHTING LEARNING PROCESSES

SUMMARY

Employ blogs to offer students avenues for reflecting and discussing their learning activities and results, as well as for creating a community of peers and instructors. When facilitated properly, the blogs will offer valuable insight into students' learning processes.

PROBLEM

In hands-on courses, particularly those with online or distance learning phases, one dilemma instructors may frequently face is that they see the solutions that students are contributing, but the learning process and the paths to the solutions are completely non-transparent. Particularly in learner-centred settings the processes students go through should receive as much weight and emphasis as the products they deliver. Essentially, the problem occurs when the teacher wants access to the students' learning paths (e.g. tracking of problem-solving processes, or concept development processes, or project negotiation processes). The motivations for this can be manifold. For instance, the teacher wants access to learning paths when there is one right answer, and for those when there is no one right answer but there may be more and less appropriate ways of working. The teacher may also want to provide formative assessment of the process as a complement to summative assessment of the resulting product. Classical approaches and technology, for instance discussion boards or learning diaries, provide only partial remedy because they typically lack simplicity, immediacy, transparency, customizability, and support for intuitively structured instructor-student and peer interactions. This pattern proposes the use of student blogs as a viable means to tackle these problems.

CONTEXT

– This pattern is useful in course settings where none or few of the actual learning activities and experiences are observable by the instructor, or where peers and/or instructors are not co-located, e.g. in distance learning, blended learning, online learning.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 61–66.

– The pattern is particularly useful in settings where students have to tackle complex problems in their own ways, e.g. team projects, or complex assignments, with resources that do not give them a recipe for creating a predefined solution.
– The instructor is willing to read and reflect on student blogs. Instructors should also be open to engage in communication and virtual relationships with students, which may consume a considerable amount of time and personal effort in addition to the usual course activities.
– Students and instructor have access to the web and basic web usage skills.

SOLUTION

Offer students a space to host personal blogs, allowing and guiding them to express their reflections, problems, solutions, and other personal thoughts during their learning experiences in the course. First, we discuss the administrative part of the solution (hosting the blogs), and then we deal with pedagogical guidelines.

Hosting the blogs is easy, since there are numerous blog hosting services freely available on the web, e.g. blogger.com, wordpress.com, and livejournal.com. The following organizational steps are required to 'set up' the blogging activities in the course:

– Select a blog host (e.g. Blogger.com), or use an e-learning system that supports blogging (e.g. Moodle). If you choose the latter option, you are done with basic setup. Otherwise, tell each student to create an account and a personal blog on the blog host. It is advisable to have all blogs of a class hosted on the same host as most blog hosts require a user account for posting comments, and having the blogs hosted on multiple hosts would require each participant to create multiple accounts, which can be very cumbersome.
– Tell students to send you the hyperlinks to their blogs, so that you can visit and comment their blogs.
– At this point, the minimal setup is complete. To ease handling of blogs, it is recommended that the blogs are aggregated in some web feed reader (e.g. Google Reader, or feedreader.com). Most learning management systems (like Moodle, or dotLRN) have built-in support for displaying blog feeds on the course homepage. In this way, students are able to access the course blog roll very conveniently.

The core part of the solution part of this pattern is the pedagogical embedding of the blogging activities into the course environment. This requires creating and communicating blogging guidelines on what you expect students to blog about as well as instructions on how to do it.

– In the beginning, students will be unsure about several aspects of blogging in your course, e.g. the required number and length of blog posts, the desired content of the posts, whether or not commenting and giving feedback on peer posts is encouraged, whether and how the participation in the blogosphere will be considered for assessment.. There are different ways of approaching the

creation of these guidelines. The guidelines can be set out by the instructor, or the guidelines can be subject to discussion and negotiation with students in one of the initial face-to-face units.

– The blogging experience needs to be integrated with the students' problem-solving processes, for instance, you can ask students to blog about problems and failures they encounter during this process, about process outcomes and findings that they are proud of, or about any key events during this process. This kind of self monitoring may trigger reflective thinking processes and contribute to awareness about the importance of the problem-solving process for personal and professional development.
– To get more detailed insight into students' learning activities outside of the classroom it is advisable to set out a desired minimum participation in the blogs (e.g. 'one blog entry per contributed assignment' or 'one blog entry before each lab session or after each team meeting').
– Note that enforcement of these guidelines or requirements is another story, since there will likely be students who are less motivated to contribute to the blogosphere than others. The concrete guidelines and measures depend largely on the course in which blogs are used (see the design narrative 'Establishing a constructive atmosphere in class in which creativity and cooperation are welcome' (1.1.4) for an example).
– In any case, make sure to establish some rules for communication that suit your needs, e.g. regarding netiquette, abuse.

The most intensive and enjoyable part after getting the blogging experience running, is following and facilitating the bloggers. Here are some facilitative actions that can and should be taken by the instructor:

– Regularly take some time to read *all* new blog entries. The interval depends on the activity level and the current context in the course. For instance, during the Christmas holidays it will be sufficient to take a brief look once or twice a week to see whether critical issues come up, and if you like, to show that you're around for your students in the holidays. On the other hand, if students are expected to submit a major project deliverable within the next two days, it may be necessary to look into the feeds multiple times a day.
– There will be different kinds of blog posts. Some may explicitly seek the advice of the instructor, while others may seek feedback from peers, or point readers to relevant web pages or documents. Sooner or later, the students will also begin to throw in occasional jokes in their posts. If it is clear that the instructor's direct advice is sought then it makes sense to reply immediately. If the blog post looks like there is some potential for discussion involving peers then it may be advisable to wait for comments from peers first. In any case, try to avoid using the commenting feature as a means for 'doing it all for them'.
– To spark and sustain communication, post comments on student blog entries. While commenting, keep in mind to encourage exploration, compliment good

contributions, ask open-ended questions in the comments, encourage peer interaction and comments, and carry out similar facilitative actions.
– If you are keeping an instructor blog, be a role model and try to update it regularly (e.g. once or twice a week). Try not to overwhelm student bloggers with posting to your blog every other hour. If you have a class of mostly novice bloggers, you will find that particularly in the beginning your blog will be the part of the course material that is read the most; try to post things that reinforce bloggers, e.g. link to or mention student blogs in your own blog. It is also useful to use your blog for announcements, recapitulation of previous lectures or other important issues, or simply for clarifications after turbulent meetings.
– If you are in a blended learning setting, frequently comment on and refer to issues raised in student blogs in the face-to-face meetings. This should support the students in understanding that blogging activities do have an effect on face-to-face action.

SUPPORT

Source

The source for the pattern SPOTLIGHTING LEARNING PROCESSES is the design narrative 'Lab Course on Software Architectures and Web Technologies' (1.1.2).

Supporting Cases

Many case studies can be found in literature dealing with the use of blogs in educational settings though the intention and actual use of blogs differs greatly.

Theoretical justification

The use of blogs in technology enhanced learning environments has gained significant momentum lately (Kim, 2008; Yang, 2009). Having emerged as a form of personal web publishing in the late 1990s, instructors have only recently started using this web 2.0 tool to provide learners with a medium of communication, cooperation, reflection and journaling (Downes, 2004). It offers valuable opportunities for supporting exploratory learning and facilitating high quality learning experiences (Fessakis, Tatsis & Dimitracopoulou, 2008). There are numerous free blog hosting services available on the web; these are generally highly user-friendly, hiding all the underlying technology and supporting the blogger in his or her most essential tasks, that is posting to his/her own blog as well as reading and posting comments to other blogs. Many services additionally offer rich customization options, including facilities for maintaining a personal blog roll (i.e. frequently read blogs) or link list, provision of personal information in the user profile, and for integrating third-party services such as weather information, quotes, and so forth.

The pattern as presented here may show some resemblance with an e-portfolio scenario. Depending on the actual implementation of the pattern, there are some clear, though subtle, differences. An e-portfolio is a persistent collection of personal assets, and the e-portfolio may be reused in different scenarios, with different forms of access restrictions across different courses. The blogosphere as seen in this pattern is completely open to all participants and may be discontinued after the course is finished. However, contributions to the blogosphere may be considered as input to the personal e-portfolio. So essentially, blogs as used in this pattern are seen as an easy-to-use means of informal communication with peers, instructors, and other interested viewers.

Being already established as a web-based communications tool (Williams & Jacobs, 2004), blogs have been found to be a useful means of supporting student activity in other educational settings as well:

- Writing of blog postings is capable of triggering (or being triggered by) a reflective thinking process, which is one of the key success factors in self directed and exploratory learning. In this respect, blogs offer means of keeping a 'reflective logbook', encouraging self monitoring and evaluation of learning and practice activities (Carroll, Calvo & Markauskaite, 2006).
- Blogs can be used to track student progress by having students document their activities and 'submit' their contributions by means of blog postings (Chang & Chen, 2007). Social learning and interaction can additionally be unleashed by provision of a joint course blog (Hammond, 2006) or an instructor's blog that students can use to comment and link to their own blogs.
- Blogs offer various features for facilitating online collaboration, including linking and commenting options. As such, they may be used to enhance the learning experience by enabling the publishing of feedback and reviews by students as well as interaction between learners and teaching staff (Birney, Barry & O'Heigeartaigh, 2006).
- Blogs can be used to log reflections and opinions on activities undertaken by virtual teams. For instance, students can be asked to use their blogs to comment on their teamwork activities, e.g. attendance and contribution to team meetings, mutual support of team mates, and other factors and issues affecting teamwork (Luca & McLoughlin, 2005).
- Using blogs does not favour or discriminate any learning style. A recent empirical study (Derntl & Graf, 2009) showed that students with different learning styles have similar ways of participating in the blogosphere.

NOTES

- **Liabilities**: introducing blogs essentially adds a communication channel between students and instructors; so if you choose to deploy this channel, be sure to tune in regularly.

- **Potential risks**: Like any other form of communication, blogs can be abused by spammers or people not adhering to netiquette. Probably the highest risk comes with the mode of communication: asynchronous, written messages can bear great risks if senders and receivers of the communication misunderstand each other.
- **Extensions**: Based on the use of blogs as a form of reflective diary as presented in this pattern, blogs can be used to handle all sorts of educational activities, e.g. handing out assignments, turning in assignments, peer reviews, self evaluations and peer evaluations, e-portfolios.
- **Expected side-effects**: The use of blogs will contribute to IT and web 2.0 literacy among your students, particularly if there are many first-time bloggers.

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1.2.3 PATTERN: SHOWCASE LEARNING

SUMMARY

This pattern is about publicly celebrating student work, either digitally or physically.

PROBLEM

Often in university settings, learning is hidden – behind closed classroom doors, stored in private file spaces, or locked away in a VLE. In contrast, primary school learning environments celebrate their students' work by literally papering the walls with it, creating a more motivating and fun environment for teachers, learners and visitors. This pattern is about celebrating the output of student learning in university spaces, either digitally or physically. It shows the students that we value good work, and they should be proud of it. Issues which should be considered are privacy and inclusion. Parameters for using the pattern include the stage of progress of the displayed work, the mixture of technologies used, who selects the content, the duration of the display, and the size of audience with whom you wish to share the students' work.

CONTEXT

You could use this pattern in these contexts:

– university learners (undergraduate)
– in conjunction with learning technology such as a VLE/ Second Life or blogs.

It works within computer science, and physical versions of this pattern are common in art or design schools. However, it could potentially be used at any educational level or in any discipline.

Forces

There are a couple of issues to be aware of when working with this pattern: inclusion and privacy.

Consider the issue of inclusion: you want to celebrate students' work, but what does this mean for the students whose work is not showcased? They will perhaps feel left out or undervalued, or resent those whose work is shown.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 67–71.

What about privacy? When selecting content, you need to think about whether the students will react well to having their work displayed. You want to create a safe classroom environment where the students feel encouraged but not pressured. Students may feel stressed if they have to verbally present work within a large class, but may feel more relaxed if their work is shown on a display. For example, I once had a student with a social phobia who was very distressed at the thought of his work being peer nominated for a verbal presentation in class. Such students are even more likely to feel worried when presenting outside the class group to visitors or other year groups of students.

SOLUTION

A solution to the problem is to create a highly visible display of artefacts created as a result of learning. This makes it explicit what is valued within the learning context, and is motivating for students. From the point of view of the student whose work is showcased, it is recognition of their effort and a celebration of their success. From the point of view of students viewing the work, it is a model to aim for, and a prompt to strive to equal it. In domains where there are many possible solutions to a problem (as is common in design disciplines) a display of multiple different ways to excel can be used to begin a dialogue between learners and instructors about the criteria by which learning is assessed.

I recommend planning the sort of showcases you will use well in advance of running a course so that you can deal with logistical issues such as booking a room for final presentations/prize giving or setting up space on the university pages. You can mix and match between different sorts of showcase according to the parameters discussed below (for example, a series of regular, informal showcases of formative work in class can be complemented by an end of term summative display in a more public venue):

– Stage of progress: Show-casing learning can be effective as formative or summative feedback, by self, peers or tutor. Claxton recommends that not only pristine final products should be displayed but also works in progress should be on view (Claxton, 2008). For example, visitors to a primary classroom might see a display of imperfect papier mache sunflowers which the children selected to share because they learned a lot from making the mistakes which led to the botched flowers (formative, reflective self assessment). In contrast, the ‘Good Work Board’ in schools generally displays the last iteration of a piece of work, such as the ‘neat version’ of a story (summative tutor assessment). If the tutor selects what is to be displayed, they must also choose whether to show the end point of learning in which the desired skill has been entirely mastered by the most skilled member of the class, or to show cases where a learner has partially mastered a skill, but whose effort should be rewarded.
– Technology mixture: At one end of the spectrum you could make a paper ‘Good Work Board’ to hang on the wall of your teaching space. At the other end you

could have a dynamic display of digital content on the university web space. Or you could have a digital display on physical screens in the university department, for example in social spaces or as screen savers in computer labs.

– Selection ownership: Who has ownership of this system? Do you want it to be staff lead as a way of modelling good work and encouraging students to emulate it? Or do you want it to be student led, where students have responsibility for selecting, filtering and maintaining content for their peers? This would be suitable for encouraging a student sense of community.
– Context of display: where will it take place, and for how long? Options include a quick demo of student work in a lecture, pointing out good work in the lab, making a display for a class wall which lasts for a semester or a more permanent display for a department exhibition space.
– Medium: What will you display and how will it be presented? Will it be an oral presentation by students? Will it be photos or screen shots of student work? Written work? Physical artefacts?
– Audience size: The least threatening for students is displaying to a small group of friends within the class. The most stressful is likely to be a public display (such as a degree show). Points on the continuum include displaying something to the whole class, or showing work within the walls of the department.

Recommendations for balancing forces

Inclusion To avoid making students feel that their work is below par, it is important to establish with the students an atmosphere where they have encouraging feedback from the staff as a matter of course.

At the outset, decide on the criteria you will use for selecting content for the showcase (see stage of progress parameter) and make these clear to the students so they understand what is expected of showcased work. In my view, it is important to reward individuals for personal improvements rather than gold standard work by only the best students. It is also an opportunity to shine light on attitudes to learning or learner attributes such as perseverance, problem solving capacity or willingness to help others. In this way, it will not necessarily only be the top of the class students whose learning is showcased.

Another approach to avoiding exclusion is to invite students to peer nominate content as other students may be more aware of their classmate's good efforts than the staff, depending on the class size (see selection ownership parameter). This will help to avoid the case where a student thinks that their work has been ignored or undervalued, where in fact the instructor has simply not had the opportunity to see it.

Privacy As privacy is a delicate issue, it is worth discussing with the class what they feel comfortable with in terms of sharing their work.

Students will have different views on this so you need to find a way to make showcasing fair for the whole class (particularly if it is tied to summative assessment)

while avoiding stressful pressure on shy students. Manipulating the audience size and medium parameters can help to reduce the pressure. For example, if you have a class of new students with low confidence, a small, trusted audience might work best initially. Similarly, some students may find oral presentations more worrying than displays of artefacts they have created (although this is probably related to the discipline of study). If you know a particular student is likely to be embarrassed by having their work showcased, it is a good idea to ask their permission first. In the long run of course, we wish our students to be comfortable with discussing their work with other people in a variety of media.

If the work is to be shown in a very public place for a considerable length of time, you might want to consider whether you need to get the students to sign consent forms. For example, one of my computer science students suspects the university of wanting to hoard his intellectual property and is wary of having his software displayed on university web space. In my view, it is not necessary to ask consent to discuss work within the class as long as the students are aware that you are likely to do this as a core part of learning.

Examples

- End of term showcase in which prizes are given for peer nominated work. Nominated students present their work, and the staff give a prize to the best.
- Star of the Week when a lecturer mentions a student who did good lab work during the week in a lecture, pointing out what they have done well.
- Departmental web pages which show excerpts from work of current students.

SUPPORT

Source

The source for the pattern showcase learning is the design narrative ‘Star of the Week’ (1.1.3).

Theoretical justification

In terms of Black and Wiliam’s (2009) theory of formative feedback, the visualisation of processes attendant to learning fits into the notion of contingency. The conceptual understanding of learners is made tangible and interrogable, normally through processes of reflection and meta-reflection, and opportunities are created for both teacher and learner to take action and make deliberate decisions. In terms of the Conversational Framework (Laurillard, 2002) this pattern relates to bridging the gap between the learner’s and the teacher’s conceptions. Visual representations externalise the learner’s conception and provide a basis for learning conversations between the learner, teacher and peers to take place. This pattern contains several

features which potentially meet Nicol's (2007) 'principles of good assessment and feedback':

- encourages positive motivational beliefs and self-esteem
- encourages interaction and dialogue around learning
- facilitates the development of self-assessment and reflection in learning
- helps teachers adapt teaching to student needs.

In relation to Webb and Cox (2007), the pattern addresses the first two principles:

- to start from where the learner is and recognising that students have to be active in reconstructing and formulating their ideas; to obtain feedback from individual students to determine what their existing ideas are
- for students to be active and for teachers to encourage, and listen carefully to a range of responses.

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1.2.4 PATTERN: REACTION SHEETS

SUMMARY

Soliciting students' reactions to individual course units provides the opportunity to make teaching and learning truly student-centred. Educators get a chance to learn how students perceived their educational offering after each major course unit. Students are encouraged to develop capabilities to reflect on their experience and at the same time to give honest feedback. Typically reaction sheets are used to collect students' perceptions and feedback in an online space that is shared between all participants. If the educator is sufficiently open to the 'voice of students', reaction sheets are likely to have an influence on the follow-up units. A collective, shared perception of the course unit is available to all participants and can be acted upon cooperatively so as to enrich the learning experience. The core idea stems from the American psychologist Carl R. Rogers (Rogers, 1951, 1961).

PROBLEM

Traditionally, teachers conduct their courses according to curricular requirements and to their own ideas of what is best for students at any point in time. Students are hardly ever included in course design and hence their particular interests and ways of learning tend to be largely ignored. Often, predesigned processes are followed as a routine without sufficient consideration to the particular class, situation, and context. In order to also respect and perceive the 'here and now' of the teaching/learning opportunity, the pattern encourages learners to reflect on their perceptions, feelings, and meanings, and to share them with all the other persons (students, tutors, the instructor/facilitator) participating in the course. The pattern addresses involvement, reflection, and feedback, and promotes a dynamic evolution of the teaching/learning arrangements such as to hear, and potentially respect, the voices of all concerned. It poses high demands on educators' openness and flexibility and requires both courage and firmness in the subject matter.

Forces

The teacher as expert should provide the optimal course to pass on subject-specific content to students, as specified in the curriculum.

Each class can be viewed as an open, dynamic system and hence exhibits the properties of emergence and self-organization. Consequently, each class will tend

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 73–82.

to develop differently from any other and will need to be examined thoroughly if student-centred learning is to be facilitated.

If the goal of education is also to raise democratic citizens, reflection and critical, as well as appreciative, thinking needs to be encouraged. Reaction sheets facilitate the voicing of one's perceptions, feelings, and thoughts.

Reaction sheets need time and space in the curriculum. Introducing them, reading them, discussing them in class, and considering them in the preparation of follow up units takes time and effort. A conscious decision as to whether the 'democracy' enabled by reaction sheets is possible and can be afforded in particular teaching/learning setting is needed.

Reaction sheets can be highly worthwhile for those educators who want to continuously learn from their students.

CONTEXT

Reaction sheets are applicable whenever a constructive climate has been established in class and students feel safe to express their honest reactions. It is essential that the teacher/facilitator is genuinely interested in having students' reactions expressed and is willing to read them and, in turn, react to them. In practical terms, an online facility for submitting and displaying reaction sheets is needed. Furthermore, some space in the curriculum is needed in order to be able to react to students' expressed thoughts, questions, wishes, etc.

Soliciting students' reactions has proved very effective in terms of having considerable effects on the course process and on students' behaviour in intensive classes with up to 25 students (Motschnig-Pitrik, 2005; Motschnig-Pitrik & Figl, 2008). However, in the author's experience large classes can also profit from reaction sheets. In these classes it is quite usual for only a few students take up this means of giving feedback and so the time needed to read reaction sheets tends to be acceptable.

SOLUTION

A reaction sheet is the online reflection of a course participant (usually a student, at times also the educator/facilitator), written to encompass the meanings, content, feelings, observations, thoughts, ideas, etc., the participant has in response to a course unit. In order to introduce the reaction sheet facility, the following steps have proved useful:

– A course unit is held. Initially, the motivation, meaning, and procedure of submitting and reading reaction sheets are explained. Students may be asked whether they prefer the reaction sheets to be anonymous or associated with their names. Only in the latter case it is possible to consider – in the grading process – the reaction sheets as part of the students' active contribution in the course.

– Each learner independently explores and formulates his or her reactions and submits their reaction sheet online.
– Learners (optionally) and educator read the reactions.
– The reactions are shared in class and potentially have an effect on the following units. For example, issues that remained unclear or raised further questions can be taken up again. Other examples might be the students' wish to do more practical exercises, more/less theory, have two short breaks instead of one longer break, discuss the reaction sheets more/less intensively, or have more/less guidance by the facilitator.

The flowchart in Figure 1 schematically illustrates and summarizes the reaction sheet process. First, the instructor explains the motivation and meaning behind reaction sheets and provides basic information on the expected content and ways to edit, submit, and read the reactions. The instructor's request for reactions to a course unit is followed by the submission of students' reactions and the retrieval (and reading) of reactions by the instructor, and, optimally, by the students as well, prior to the subsequent course unit. The final face to face activity hosts an essential part of the scenario where the instructor and the students attend to the submitted reactions at the beginning of the following course unit. This generic process is self-contained, and can be embedded (also with variations) into concrete course settings that include course units to reflect upon. Figure 2 illustrates a screen shot showing a fragment of a reaction sheet report as it appears to students and their educator(s).

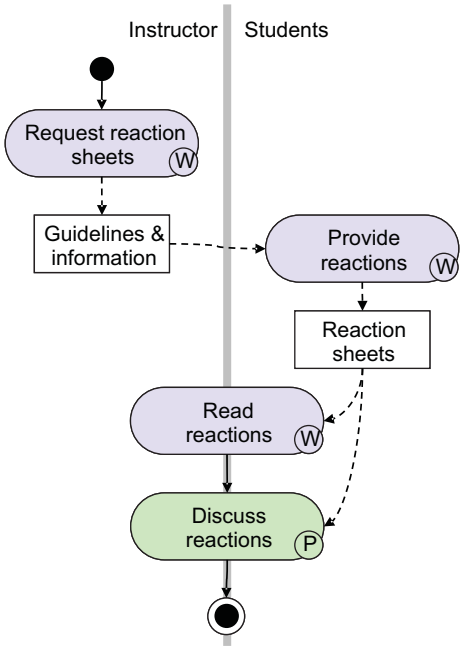

Figure 1. Online reaction sheets scenario (adapted from Motschnig-Pitrik & Derntl, 2008)

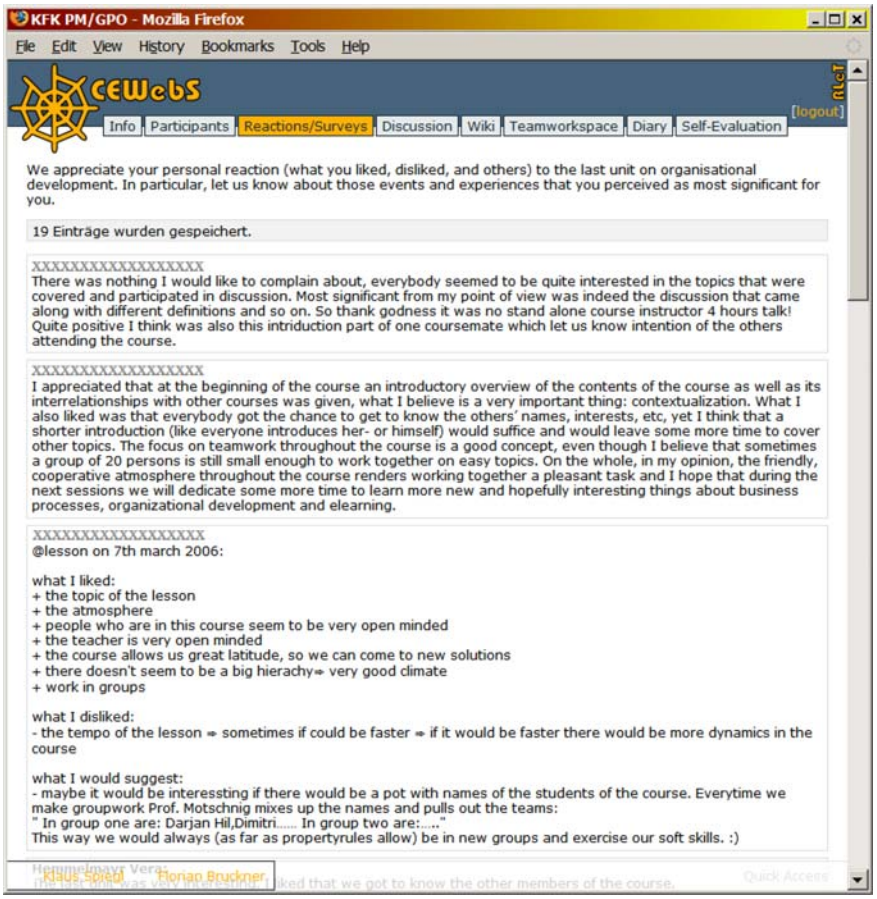

Figure 2. Screen shot from the web-service supporting reaction sheets (student names crossed out).

RELATED PATTERNS

Reaction sheets could also be made part of an accompanying ePortfolio.

SUPPORT

Source

The source for the pattern REACTION SHEETS is the design narrative ‘Establishing a constructive atmosphere in class in which creativity and cooperation are welcome’ (1.1.4).

Supporting Cases

In order to allow readers to get an impression of the course setting and atmosphere that accompanies and is accompanied by reaction sheets, let us inspect some concrete students' reactions. Since the following examples illustrate the course atmosphere in the first place, they are characteristic for both the source and the supporting cases where this method has been used. One student noted: 'I liked the first workshop and appreciate a course in which students get the chance to openly talk to one another, discuss, and share their views. Sitting in a circle was a well planned setting that has facilitated face-to-face communication. I consider it very appropriate to work in teams and subsequently present the ideas. This allows us to learn how to present our views effectively. The feedback after each presentation helps to see the strengths and weaknesses and to work on overcoming the weaknesses later.'

Another student wrote as a response to the second workshop: 'In general, I found the second block quite interesting with respect to the topics we dealt with. However, as already mentioned in my first reaction sheet, I again missed the theoretical foundations. Mrs. Motschnig briefly explained the key practices for dialogue according to Bohm, but for me this was far too short …' This critical reaction shows that students dare to express themselves openly, specifically and personally.

Another student commented on a later workshop: 'I consider talking about the reaction sheets in the beginning of the workshops as very meaningful. This way we can discuss and put into practice comments and suggestions, such as the idea to use name cards which, in my view, considerably contribute to creating a relaxed atmosphere. The moderation cards regarding the themes 'What is important for me as a speaker/listener' enabled one to identify issues of common concern as well as a variety of issues that one has not considered on one's own.'

Student surveys

A variant of reactions that we refer to as 'student surveys' can also be employed in the elaboration of topics. Typically, some discussion starts in a face-to-face session and when it cannot be finished, students can be asked to continue online. For example, in a course on organizational development (Motschnig-Pitrik et al., 2007) we started to discuss what it meant for an organization to move forward. The initial discussion was then continued online in reaction surveys, in which each student expressed what it meant to him or her for an organization to move forward (see below). A team of students then evaluated the results as part of their team project on learning organizations.

As another example, in a course on organizational development we studied Senge's (2006) disciplines of the learning organization. A brief (about 20 min) slideshow introduction was followed by a face-to-face discussion and the distribution of reading materials. Then students were asked to post their most important insight to a shared online space. This activity was meant as a preparation to stimulating team

learning by leading to further evolution of authentically arising topics by individual teams. The following illustrates the rich variety of students' open reactions and lets the readers form their own view on how far this collective resource from the web can spark further creative questions and tasks to be elaborated by teams. Students' online reflection on Senge (2006) included such statements as:

'For me the most important insight is that the employees are the centre/heart of every enterprise. The task we have to deal with is to exhaust the available capacities in full. This can only be reached by a soulful balance which takes into consideration all influences. Based on the five disciplines – Personal Mastery, Mental Models, Shared Visions, Team Learning and System Thinking – it is possible to promote the talents of all employees or handle them in a more effective way. In this manner not only the people are learning, also the whole enterprise in itself can develop and reach a higher level of performance! In my opinion, the concept of 'Mental Models' seems to be really problematic. The structures which were lived or learned over years/decades will probably hardly be put down or revised in any way from one 'who knows it better'.'

'For me personally what I've read about mental models is the most important insight in the context of Senge. I really think that misunderstandings between people as well as a wrong assessment of a situation can be avoided if we learn to overcome the mental models we have.'

'Senge assumes that an average person should identify with the company's vision, be able to define his/her own mental model, be able to compare it and learn from others in order to be able to help their team to learn from within … nice, but why? There are simply 'tons and meters' of workers who just want to get their 9-17 shift done, earn their living and go home. What if people don't want to help their organizations become learning organization? Mental model what? Team learning … ha? Personal mastery … kung fu?'

'All disciplines seem to highly depend on 'personal mastery' as the most basic step to the learning organization. You have to go inside yourself to identify your personal vision and make it reality by using your creative tension. Without this tension, you will not reach anything but with it, you can use the other disciplines to master yourself in the context of an organization which uses your individual personal vision in the context of an organizational shared vision that again is embedded into a system context. The awareness of all five disciplines is necessary to evolve. […] You need to be open and not to be afraid of being embarrassed. This can only be done collectively in a team.'

'For me, the most important thing was that there is something like defensive routines. I think everybody has these defensive routines, but nobody knows much about them. To negotiate them is a very big step in improving your quality of life, and the quality in communication and working together with other people.'

'In my opinion, the original thing with this book is that all disciplines are integrated with each other. Senge emphasizes the importance of 'seeing things as

a whole' rather than 'seeing parts' and seeing people as 'active participants' not 'helpless reactors' etc. and mental models are at the core for all other disciplines. But it is not that simple to achieve. Because for me it is the hardest thing in the world to change somebody's mentality. If someone sticks to a certain way of seeing things, it is very hard to change/affect her or his opinions.'

The following are examples of what the students wrote in the final reaction to the whole course on organizational development:

'The main thing I take with me from the course is the content and the procedure of the discussions and participative decision making. I never experienced that extent of discussions and involvement in other courses.'

'The most important I took home from this course is to take nothing as given. There is always a way to have influence on certain things. I think this course opened my mind for other learning experiences than the traditional lectures. It was a hard and irritating experience in the first units, but I think I adapted to the situation and finally I felt kind of comfortable. I really think this course had a major influence on how I will handle learning situations in the future.'

Starting point for content analysis

Note that the reaction sheets can equally be used as a basis for conducting a qualitative content analysis, as exemplified in Kabicher and Motschnig-Pitrik (2008).

Input for formative evaluation

Reaction sheets are well suited to serve as a part of a formative evaluation procedure of a course (Kabicher & Motschnig-Pitrik, 2008; Motschnig-Pitrik, 2006).

The following examples are based on Motschnig-Pitrik and Derntl (2008). It is intriguing to observe that although students' reactions often tend to converge in one direction, different students focus on different aspects and sometimes students take opposing standpoints. For example, in the last term most students found it helpful to prepare for a five-minute presentation of the outline of their team project and to receive the group's feedback within the workshop unit. But there was also a reaction stating that a student felt bored by the facilitator's detailed feedback to a team, and also that it would be better to know the task beforehand so as to be able to collect ideas in advance. If the facilitator succeeds in perceivably respecting some of the critical voices, for example by indicating an upcoming task to be done in the next unit in advance, or by keeping feedback to individual persons short, such behaviour tends to leave a strong impression on students. Frequently, a cooperative and warm atmosphere evolves in which students are inspired to high achievement and detailed feedback. People and teams tend to react in a genuine and real way, both online and in face-to-face encounters. In more advanced stages of the course, true dialog can be reached. This way all participants can learn substantially and significantly from

issues that are successful as well as those that turn out not to be successful. To allow our readers to get their own experience from reading students' reactions we quote excerpts from the reflection on the team-project presentations mentioned above.

One student notes: 'I found the preparation of the concept for our team project very good. One could already perceive some sense of community within the team and collect initial ideas regarding the topic. Equally, one could listen to the opinions of others.' Another student is more critical, he reflects: 'To be honest, this unit was not as exciting for me as the others were. In my view it would have been sufficient to discuss individual topics with the instructor. Frankly, I was not really interested in the other topics and how they would be dealt with.' Yet another student writes: 'I really liked the fact that we seriously considered the team assignment. This way, each team got the opportunity to consider the contents of their work. The feedback in response to the presentation makes it easier to compose the project, since one knows in which direction it will be heading.' Another reaction reads: 'The fact that we elaborated the concept during the course unit resulted in some benefits. We had time constraints that caused pressure that I found constructive. One could immediately check one's concept with the facilitators to get feedback. I found this very good since in other courses you get the feedback only after putting together a complete version and changes regarding content cost much effort.'

Theoretical justification

Student inclusion If applied appropriately, reaction sheets increase student-centeredness (Cornelius-White & Harbaugh, 2010; MsCombs & Miller, 2006) in so far as they encourage students to reflect on their learning and to engage in the class community.

Orientation for the facilitator Reciprocally, reaction sheets make it possible for the instructor/facilitator to 'hear' the students (Rogers & Russell, 2002).

Group process – mixing oral and written expression I have often experienced the reaction sheets having the potential to accelerate the group process. The cohort appears to move faster to productive cooperative and co-creative phases (Kabicher and Motschnig-Pitrik, 2008). My hypotheses are that this is due to:

- the continued contact even between individual face-to-face sessions
- the fact that the more spontaneous face-to-face exchanges are complemented by the more deliberate online reflections
- the fact that some persons don't speak much and hence tend to be less well known by the group. However, often these students submit insightful reactions and thus become better known through their 'written voices', such that they may be trusted more than if they had kept silent on all channels of expression.

Verification

Students tend to say that the reaction sheets deepened their learning. They are a form of written reflection that increases the students' capacity to reflect upon their own and other people's actions as well as the group process. As such, they can offer invaluable insight into one's actions and, due to their use in a class-community context, they contribute to the students' broadening their view to include their colleagues' perceptions. Since this broadening is by no means imposed but rather self-initiated, it has a high probability of being assimilated into the students personality structure (Rogers, 1961).

Interestingly, some students experiment with submitting reactions immediately after a course block versus submitting them a few days later. They tend to find that their experience changes over time and that gaining some distance to their immediate experience has clear effects on the character and quality of their reactions. Details often become less important while longer lasting questions, meanings and relationships to other experiences crystallize, and this process needs time.

Scenarios / solutions which were developed using this pattern

Students can refer to their reaction sheets as reference points when writing their self-evaluation. The quality of a student's online reaction can be made part of the grade.

NOTES

Note that 'success' depends on the way you motivate students to write reactions and on the way you handle them. Including the act of writing reactions (and not whether they are critical or positive) as a facet of active participation into the grade can raise student motivation. Once students perceive being 'heard', they tend to gradually develop the capacity of writing genuine, constructive feedback in which personal expression takes the place of judgment.

Potential risks: If a constructive, trustful atmosphere has not yet been established in class, then students may be reluctant to share their perceptions openly. Also, students may use offensive expressions when dissatisfied. Hence, it is essential to schedule time for discussing the reaction sheets in the follow-up face-to-face unit.

Expected side effects: Students learn to reflect and to give feedback. All students, even those who don't speak up in class have equal opportunities to voice their perceptions and concerns.

Extensions: Some structure can be suggested, if particular feedback is sought.

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1.2.5 PATTERN: GENRE-BASED DEVELOPMENT OF ACADEMIC WRITING SKILLS

SUMMARY

Designing academic literacy support programs is a very complex task. These designed programs aim to assist university students, in particular international and other students who are non-native English writers/speakers. These students have a range of language problems. In this pattern the authors will show how to apply genre theory to address students' language difficulties in written assignments.

PROBLEM

Support for academic literacy is essential for university students. For many first year students, in particular international and other students who are non-native English writers/speakers, language difficulties are the main issues when writing their assignments. Their main problems include the lack of textual structure and critical analysis, unclear thesis, illogical development of arguments and grammatical errors.

This pattern aims to help students learn how to use the schematic structure and explicit forms of language which repeatedly appear in their unit of study. Examples in this pattern are drawn from the course Object Orientated Computer Program: Writing a Use Case.

Forces

The force in action is the increasing demands for providing support to students who have language difficulties in academic writing. Students with language difficulties need to model and practise the recurring textual structure and language features used by experienced writers. They also need to ensure there are no grammatical errors in their assignments in order to score high marks.

CONTEXT

This pattern can be used in the contexts of literacy curriculum design, workshop training for academic writing and assignment guidelines. It can also be used as

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 83–92.

material to help students understand how language choice is deployed by experienced writers to get better marks. In the following, each context is explained in detail.

– *Curriculum design for an academic literacy program*: In this context, the pattern provides a theoretical framework and check list for the contents of the program. The text type concept (genre) helps to clarify the text structure and the language features. It also provides some guidelines for selecting model texts and the design of learning tasks and discussion questions.
– *Literacy workshop material design*: The four modules in the pattern can be adapted for literacy workshop material. For example, the exemplars can be replaced by texts which are directly related to students' specific areas of interest in their course. Similarly, the sample questions and activity tasks can be easily adapted to suit course contents and other disciplinary circumstances.
– *Assessment guidelines*: The Unit Coordinators or course lecturers can use the solutions embedded in the pattern as guidelines to design assessment marking criteria. In addition, examples in the pattern can be used to highlight essential requirements and expectations of the standard required to pass a written assignment.
– *Useful learning resource*: With some modification and adaptation, the pattern contents can be used as student self-directed learning exercises. Students can use the sample texts to relate to their own writing as a benchmark text for their assignment. The grammatical focus in the pattern can also remind students to check grammatical errors in sentence structures and common errors in their writing.

In summary, the pattern captures the key principles based on the genre approach. While it is specific enough to guide the design practice of literacy programs it is flexible enough to allow adaptation to suit different contexts and students' needs.

SOLUTION

This pattern covers two concerns: the first is the understanding of the concept of genre in academic writing. This addresses the purpose and the different schematic structures of written texts. The second is the language and structure commonly used in writing different text types, for example, a use case. Teachers can use this pattern to help students model their writing. The details of solution application are as follows:

– One of the major problems of students' writing is the lack of structural staging. The genre approach is useful for resolving this problem. Models of well structured texts by experienced writers in the field of study could be used to model practice. Exemplars can be selected from different written assessments, such as an essay, a report or other written texts to illustrate the standards required.
– There is a need to address students' grammatical errors in tenses and sentence structure. The repeating language features displayed in a text type discussed in this pattern aim to help students use tenses correctly. In addition, the pattern highlights specific features (e.g. noun groups and nominalisation) and sentence

structures typically used in a text type (e.g. the use of active vs. passive forms). Students develop confidence and proficiency in writing different texts within the convention of this discourse practice.

– The grammatical focus in the pattern helps to resolve the conflicts between rigidly following grammatical rules and writing meaningful sentences. Sometimes students follow grammatical rules but construct sentences which do not make any sense. Knowing how noun groups and nominalisation are formed helps students scaffold meanings embedded in complex noun groups in a sentence. In addition, it helps students improve their proficiency in composing compound and complex sentences in academic texts. The modelling and practice of writing a discipline specific discourse is beneficial. Such activities are more directly related to students' needs and learning experience. Students are more inclined and motivated to learning things that are directly related to learning outcomes.

Based on the solutions suggested above, what follows provides some guidelines for literacy program design. For details of each module contents see the modules discussed in the design narrative 'A genre-based approach to the development of academic writing skills' (1.1.5).

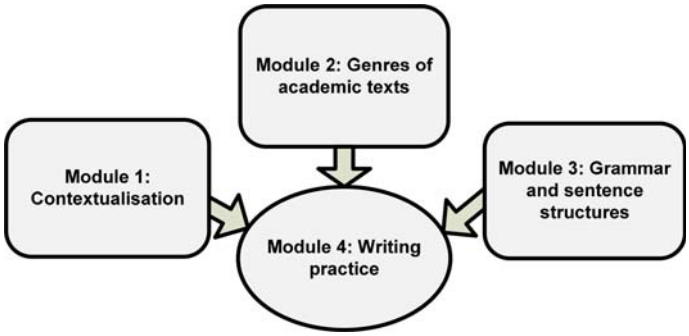

Figure 1. Module contents.

Module One: Contextualisation

Module one introduces the concept of language function and social context to increase students' cultural and disciplinary proficiency. Discussion tasks are used to encourage students to talk about the academic contexts and purpose of writing different assignments in their studies (see example of writing a use case later in this chapter).

Module Two: Genres of Academic Texts

Module two introduces the concept of genre (text types) of different written assignments, for example, an essay, a report, a descriptive or a procedural text.

Different texts have different schematic structures and specific language features. The awareness of this academic practice is important.

Module Three: Grammar and Sentence Structures

At university level, students are expected to use a variety of simple, compound and complex sentences correctly in their written assignments. In this module, selected sample texts can be used to identify different sentence types and other language forms, such as a noun, a verb, an adjective, an adverb, or passive and active forms of verbs. Separate worksheets can be used to practise writing correct sentences with key words provided.

The grammar session can also focus on the correct use of single and plural nouns, noun groups and third person present tense (see details in the design narrative 1.1.5).

Module Four: Writing Practice

In this module, students are required to combine all the knowledge learned in the three previous modules. Students are given a task, for example, to write a short text presenting an argument or describing a process. This activity is best performed in class as the lecturer can give instant feedback on the students' writing.

EXPLANATION AND EXAMPLE OF HOW TO APPLY THIS PATTERN IN WRITING A USE CASE IN COMPUTER SCIENCE AND OTHER DISCIPLINARY CONTEXTS

In what follows, the authors present an example, using the Moggan use case, to illustrate how a literacy pattern can be adapted for writing a use case. This example of a use case is based on the real life context of the Moggan Bay Sailing Club Regatta (Box & Ferguson, 2002).

1). The understanding of social context (Refer to Module 1)

The Moggan use case is used for the race nomination acceptance process and it is highly contextualised in performing the specific functions of a sailing race registration. The system must provide an ability to check the skipper, the crew and the boat for eligibility for the race, to accept/reject nominations and notify users of the registration outcome. In order to carry out these functions, a sequence of interactions between the actor (the skipper) and the system has to take place (see examples in the description below).

Activity: The discussion of social context and register category Before writing a use case the understanding of its social context helps students identify the circumstances in which an activity is taking place.

In this use case it is the acceptance of nomination to participate in a regatta.

Example of discussion questions
In groups or in pairs, discuss the following:

- 1.What is language?
- 2.What is social context?
- 3.What is social purpose?
- 4.What is a use case?
- 5.Use the Moggan use case to illustrate your understanding of its social context and social purpose.

Note: The following will give an example of how to adapt this activity to other forms of assignment, such as writing a persuasive essay.

Adapted discussion questions for essay writing:

- 1.What is language?
- 2.What is social context?
- 3.What is social purpose?
- 4.What is a persuasive essay?
- 5.Use an example to illustrate your understanding of a social context and purpose of writing a persuasive essay on the topic of 'Sustainability and our future generation'.

2). Identify the Textual Structure (Refer to Module 2)

In language teaching (Martin & Rose, 2003; Martin, 1993; Hasan, 1996; Halliday, 1994), the following staging is termed as the genre structure of a use case. The left column is the structure (the staging or heading) and the right is the content in each section.

Use case:	Accept nomination
Category:	Core
Actors:	Skipper
Description:	This use case begins when a skipper submits a nomination to participate in a regatta. The skipper, the crew and the boat listed in the nomination are checked for eligibility for the race. The boat is recorded as a nomination in the regatta. The use case ends when the skipper is advised of the acceptance of the nomination.
Purpose:	To register the nomination of a boat, the skipper and crew in a regatta.
Trace:	Business functions: 2.1, 2.2 and 2.3
Source document:	Regatta Entry Form
Notes:	In regard to regattas which have passed the date by which nominations close but have not yet occurred the user decided that these regattas will not be available for late nominations, late nominations are not accepted for any regatta (Box & Ferguson, 2002, p.230).

Table 1. The linear schematic structure of the Moggan Bay use case

Name of use case
Category
Actors
Description
Purpose
Trace
Notes (optional)

3). Illustration of language features in the Moggan use case (Refer to Module 3)

The following is an example of the use of these language features in a use case: This use case begins when a skipper submits (present tense) a nomination to participate in a regatta. The skipper, the crew and the boat listed in the nomination are checked (passive form) for eligibility for the regatta. The boat is recorded as a nomination in the regatta. The use case ends when the skipper is advised of the acceptance of the nomination (nominalization: accept/acceptance, nominate/nomination). The submission may be online or on a form that is received and entered into the system by the race administrator (nominal group).

4) Writing practice (Refer to Module 4)

Example of exercise for practising tenses Filling in the blanks with the correct tense:

1. This use case is (complete) _____ after a document submission drop box is created and (return) _____ to the academic.
2. This task is completed when the individuals are (inform) ____ of their entry.
3. This use case is completed when the administrator is advised that all the documents (be) _____ sent to the recipients.
4. This use case is completed when the participants (be) _____ issued with a receipt.
5. This use case is completed after the requested documents are (retrieve) _____ and (place) _____ in a user specified order and delivered to the user.

Answers: 1) completed, returned; 2) informed; 3) have been; 4) are; 5) retrieved, placed

Example of nominalisation In this session we will explore more distinctive language features in science texts/genres:

Table 2. Language features of the Moggan Bay use case

Language features	*Examples*	*Explanations*
Present tense	The use case begins when a skipper submits a nomination.	We use present tense to describe a habitual or usual action, a procedure or a situation.
Passive voice	The skipper, crew and the boat of nomination are checked for eligibility.	We use passive voice to focus on what happens to the person or the object.
Present perfect	All submissions which have passed the date of nominations are not accepted.	We use present perfect tense to describe an action or event which is completed but is still connected in some way to the present.
Nominalisation (Nominalisation refers to a verb or an adjective being changed into a noun, e.g. Accept, acceptance, eligible, eligibility)	The use case ends when the skipper is advised of the acceptance of the nomination.	In academic writing, nominalisation represents a formal writing style, condensed meanings and a focus on ideas rather than action. Students need to learn the rules for changing a verb/adjective into a noun. For example: the verb complete is changed to completion by deleting the 'e' and adding 'ion'. Students with language difficulties may sometimes find mastering these rules challenging, although native English speaking students may do it automatically without knowing these rules of grammar.
Nominal group A nominal group is sometimes referred to as a noun group. In a nominal group there is always a headword with pre or post modifier/modifiers (sometimes with both)	Source document Regatta Entry Form Late nominations	Nominal groups allow us to construct very concise expressions. Students need to apprentice the skills in unpacking and constructing them. For example: 'a completed regatta program' is used instead of 'a regatta program which is completed'.

– nominalisation
– verb + ed as premodifier
– e.g. complete ─ completed nomination (premodified: the nomination which is completed.)
– verb + ing as premodifier
– sail ─ sailing boat (premodified: what kind of boat? A sailing boat).

Example of exercise for practising noun groups Change the following sentence fragments into a nominal group:
e.g. The acceptance of a nomination has been completed (the completed acceptance of a nomination)

a. The department which develops software (the software development department)
b. The statement which is required (the required statement)
c. The policy which has been requested (the requested policy)
d. The draft that has been edited (the edited draft)
e. The details which have been submitted (the submitted details)
f. A range of perspectives which are differing (a range of different perspectives)
g. The requirement for training (the training required)..

Illustration of Using Student Sample Text (Refer to Module 4) Task: The following text was written by a previous student.

1. Identify the problems in the text (focus on the highlighted sections).
2. Rewrite the description.

Student text of a description: This use case commences when a user requests the retrieval of submitted documents. The system should retrieve the requested documents. This use case is completed when the system has attempted to retrieve the documents and delivered them to the user (if the documents were available).

Suggestion of re-written text of description: This use case commences when a customer requests the retrieval of submitted documents. The submitted documents are retrieved. This use case ends when the retrieved documents are delivered to the customer.

Writing activity: Use a scenario in the text book and write a description of a use case.

SUPPORT

Source

The source for the pattern academic writing skills is the design narrative ‘A genre-based approach to the development of academic writing skills’ (1.1.5).

Supporting Cases

Yang (2008) and Yang & Goodyear (2004) provides some useful additional cases for the academic support within genre framework.

Theoretical justification

In this pattern, the authors make a deep connection between problem and solution. This claim is supported by the application of genre theory in Systemic Functional Linguistics (Halliday, 1994; Hasan, 1996; Martin, 1993; Martin & Rose, 2003) to effectively address students' writing problems in written assignments.

According to Martin (2000), from a semantic perspective we interpret genres as the staging in making meaning. From a social perspective we characterise genres 'as staged goal oriented social processes' (p.4). Genre is a system of texts, consisting of the consistent process of making meanings and schematic structures used in various social contexts (Halliday, 1994; Martin, 1993; Martin & Rose, 2003). For example, we make a phone call by firstly dialling the number, saying 'Hello' to the other person on the line, explaining the purpose of the communication (for example, just to say hello to keep in touch, to make an enquiry or complaint or to request help).. Then the conversation ends by saying 'Goodbye' or 'Thank you'.

Genre is a valuable theory for teaching academic literacy. In a discourse community, text type and specific language choices are deployed by community members to share their expertise and technical knowledge (Swales, 1990). In order to be recognised and accepted by a discourse community, students need to develop their knowledge about the explicit use of genres and language forms in the course of their study. Students gain apprenticeship in these language skills through classroom dialogues and writing academic essays, oral presentations and other forms of academic activities (Halliday, 1993; Lemke, 1989; Martin, 1993, 2000; Unsworth, 2001).

Verification

As mentioned previously, developing academic literacy programs is a challenging task in addressing students' problems in academic writing. The pattern based solution proposes genre theory as a valuable framework for developing students' knowledge about language. As reported in Yang and Goodyear's previous work (Yang, 2008, 2010; Yang & Goodyear, 2004) pattern languages can be used for designing a network of reusable patterns, capturing the pedagogical strategies, available resources and teachers' knowledge to support language skills development. The problem solution based framework is valuable for addressing students' specific language problems for a particular subject or those of a particular learner group.

RELATED PATTERNS

This pattern can be used in conjunction with other patterns, such as patterns of social context, patterns of social purposes, patterns of genres, patterns of sentence constructions, patterns of tenses and patterns of noun groups. Yang (2008) and Yang and Goodyear (2004) provides some useful additional patterns for academic support within the genre framework.

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1.2.6 PATTERN: CONTENT MORPH

SUMMARY

Keeping the structure of a game and the educational principles, but changing the mathematical content addressed.

PROBLEM

Suppose a given game proves to be effective for educational purposes for a specific mathematical content. Then suppose that another mathematical content has to be addressed in a playful way. Instead of starting from scratch one may want to start from the first game and try to develop a new game that exploits similar educational principles but addresses the new mathematical content. How can this 'morphing' be performed effectively?

CONTEXT

The pattern emerged from a context where a group of educational researchers were cooperatively designing and deploying educational software and games. The objective is that once a designed game is found to be fruitful from an educational point of view, the researchers (or teachers) involved try to extract the key ideas of the game in order to re-use them to design other fruitful games addressing different mathematical content. In order to do so it is important to identify what are the elements/characteristics of the original game that can (or cannot) be adapted to the new mathematical content, and how this can be done. Moreover, as different mathematical content may need to be addressed in different ways, this pattern is fundamental for avoiding a loss of the effective characteristics of the original game, and for avoiding naïve adaptation of such characteristics.

SOLUTION

1. Identify the new mathematical content, and compare it with the mathematical content addressed by the existing game. Focus on analogies and differences.
2. Identify the key characteristics of the original game and how these relate to the contents it addresses. In other words find how the addressed mathematical content is represented in the game.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 93–96.

3. Identify the main educational principles underlying the existing game: for example the educational goal that is addressed by the game and how the characteristics of the game can be employed by educators to achieve such a goal (see Cerulli et al., 2005). This may include, for instance, identifying the typology of activity to be set up in order to exploit the game and may depend on the theoretical assumptions underlying the game.
4. Draft the possible main characteristics of the new game.
5. Investigate how the change of mathematical content will affect the application of the existing educational principles in the new game. This may be performed either as a desktop study in the Galilean spirit of 'mental experiments' or by actually trying to set up experimental activities with the new game using it as if it was the original game. A combination of the two approaches can be, in our experience, a productive compromise. This process can be guided by the following points:
   5.1. With respect to point 2, is the new mathematical content represented in the new game in a way that somehow recalls how the original mathematical content is represented in the original game? Find differences and analogies between such representations.
   5.2. With respect to point 3, is it possible to set up, with the new game, activities similar to those identified in point 3, that is activities based on the same educational principles?
   5.3. If points 5.1 and 5.2 give positive outcomes then go to point 6, otherwise give up.
6. Determine the characteristics of the educational context that are considered to be necessary for the existing game to be successfully deployed. Can they also support deployment of the new game? This can vary a lot and may depend on the theoretical assumptions, however in some cases they may be hard constraints such us having one computer per pupil, or having the possibility to organize pupils to play in small groups.
7. Identify the key game elements and interactions that are to be inherited by the new game, and which must be altered to support the new content.
8. Finally design the new game keeping all the structural elements of the game that are compatible with the new contents and substituting all content related parts according to what has been identified in the previous points.

Wherever possible the designers of the existing game and the designers of the new game should work towards communicating core game characteristics, stating how they can be inherited and modified in the new game design.

SUPPORT

Source

The source for the pattern content morph is the design narrative 'Content Morph' (1.1.6).

Supporting Cases

This pattern is also supported by the author's research on design, implementation and deployment of educational mathematical software in general. In particular the author experienced an attempt to bring the educational principles of Cabri (addressing geometry) to a symbolic manipulator (addressing algebra) as reported in his PhD thesis (Cerrulli, 2004). It is not possible to fully discuss this example within the limits of this document, but it is possible to illustrate the pattern by means of a simple imaginary example described below.

Numbers are often represented as segments (following the Greek tradition for instance) which makes the setting up of activities involving the sum of numbers as juxtaposition of segments easy. It is then possible to think of concrete games concerning summing numbers to be performed with concrete objects like sticks taking the new segment as the result of a sum. One may try to export such activities to the case of multiplication and of powers. Usually the multiplication of two numbers is represented as a rectangle. So suppose that the original game, to learn addition, consists of 'build the result by juxtaposing sticks', then the corresponding game for multiplication should be 'build the result by creating a rectangle with sticks'. Suppose that the educator's objective is that pupils learn the commutative property of addition and multiplication. In the first case the educator may ask the pupil to perform with sticks the sums 2+3 and 3+2, which will lead the pupil to build the same segment. So the educational principle in this case is 'by performing concretely the sum of two numbers, changing the order of the numbers, the pupil may learn that changing the order of the numbers does not affect the result'.

This 'game' could be morphed into a new game for multiplication where the teacher asks the pupils to perform different multiplications and identify in which cases two multiplications give the same rectangle. However in this case there would be a problem with the commutative property: as a matter of fact a pupil may obtain a 'vertical' rectangle 2x3 and a 'horizontal' rectangle 3x2 which the pupil may consider as different rectangles neglecting the fact that 2x3 and 3x2 should give the same result.

From the analysis of the game about sums the educational principle identified as being used to address commutativity was: 'two operations with inverted operands give always the same result'. However in the game about multiplication this principle was implemented in a way that could lead to pupils' misunderstandings. Once this has been pointed out it is possible to review the game about multiplications and change it in order to avoid such misunderstandings. Actually, one could simple ask pupils to compare the rectangles' areas instead of comparing the rectangles themselves, in this way it doesn't matter if the rectangle is horizontal or vertical.

Theoretical justification

This pattern was developed mainly on an experiential basis, however its principles are compatible with the construct of Didactical Functionalities (Cerulli, Pedemonte

& Robotti, 2005) that was formulated before the development of the pattern, but simultaneously with the development of the design narrative that originated the pattern. A posteriori it is possible that the 'spirit' of such a construct influenced this pattern.

RELATED PATTERNS

Guess my X (Mor, 2010).

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1.3.1 SCENARIO: INTERACTIVE LECTURE

SITUATION

The setting is a large course on 'software architecture' at the Accidental College of Europe (ACE). The course is held for the first time, because a new bachelor study program on 'Sustainable Information Technology' is just being rolled out. We are in the fourth semester of the new study program, and the program director tells us we will have about 150 students.

There are two instructors for the course. ACE has a limit for courses of 25 students per class due to room space limitations, so we will need about 6 groups of 25 students each. The program director has secured funding from the Dean for 6 tutors, one for each of the 6 student groups.

The study program foresees 50% of the class time taken up with lectures, due to budget limitations, and only one of the two instructors will do the lecturing.

There is an institutional VLE which supports all of the state-of-the-art modules and gadgets such as assignment handling, asynchronous and synchronous communication.

The qualification profile defined in the study program expects graduates to have acquired excellent skills and competences in communication, reflection, teamwork, decision making and self-directed work. Each course in the program is expected to deliver its contribution towards achieving this outcome profile.

TASK

The two major conflicting dimensions of our task are (1) the mandatory lecture component of at least 50% of the class time and (2) the study program requirement for significant contributions to 'soft' skills and competences in students' qualification profiles.

It is evident that lecturing will not contribute to students' interpersonal competences (like teamwork and communication). To address this conflict, we need to exploit every chance for self-direction and interaction during the lecturing time, while focusing on teamwork and hands-on problem solving in the practical part of the course to address both technical and professional skills and competences. So essentially our task is to:

- foster active participation of students despite a large lecture component
- generate deep, self-directed involvement with the core themes of the course

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 97–99.

– ensure broad general knowledge of the domain to enable students to pass the standardized end-of-semester test
– foster team skills, reflection, and communication.

PATTERNS

– INTERACTIVE LECTURE MODE (1.2.1). This pattern addresses teamwork and fosters self-directed learning including reflection activities, and introduces methods of formative assessment in addition to the final exam.
– REACTION SHEETS (1.2.4). This pattern can be used as part of the learners' personal portfolio and reaction sheets can be solicited to facilitate reflection and communication skills.
– SPOTLIGHTING LEARNING PROCESSES (1.2.2). This pattern is useful for the diary-keeping activity of the interactive lecture mode pattern and for contributing a final self-evaluation as part of BLENDED EVALUATION pattern (4.2.1). This pattern supports tutors monitoring the teamwork so that tutors can provide feedback as comments, and instructors can provide personal feedback to tutors on their comments.
– GROUP LEADER EMERGENCE (2.2.5). This pattern is used to encourage teams in the interactive lecture mode to select a team leader for their semester project.
– WEAR YOUR SKILLS ON YOUR SHIRT (3.2.4). This pattern is used to publish skills and interests profiles in the VLE to facilitate the team building process.
– FEEDBACK ON FEEDBACK (4.2.4). This pattern is used to enable tutors to receive feedback on their feedback from the instructor.
– BLENDED EVALUATION (4.2.1). This pattern is actually already part of interactive lecture mode, however it could be useful to contribute an additional self-evaluation component to the course.

SOLUTION

The pattern giving structure to the whole course is INTERACTIVE LECTURE MODE. Students are asked to build teams and engage with a self-chosen topic of the course in the form of a semester project. The projects will be completed within teams iteratively in several project milestones. Within this pattern, we use patterns for core and side activities of the interactive lecture:

– The diary activity of the interactive lecture will be realized by using the SPOTLIGHTING LEARNING PROCESSES pattern. A blog is provided for each team. The team members are expected to contribute personal comments and reflections on each of their project deliverables (i.e. milestone reflection). Tutors are asked to comment on issues, problems and achievements mentioned in the blog posts.
– The instructors follow the tutors' comments as a quality assurance activity and in order to provide feedback on the tutors' feedback. This is an implementation of the FEEDBACK ON FEEDBACK pattern.

– After each lecture the students will be asked to submit a personal reaction sheet (REACTION SHEETS pattern). The instructors read the reaction sheets and discuss their contents in the next lecture.

To manage the teams and projects, two patterns are applied:

– WEAR YOUR SKILLS ON YOUR SHIRT is applied in the beginning by asking students to post their skills, abilities and interests in their profile pages on the VLE to facilitate the process of finding team mates.
– GROUP LEADER EMERGENCE is applied by asking teams to select group leaders. From the first project milestone to the final project deliverable, the team leader will be the contact point for the tutors and the instructor.
– In the assessment phases of the course, BLENDED EVALUATION is applied. That is, the students' personal e-portfolios (blogs, reaction sheets, and a self-evaluation of the 'performance' in the team project), the tutor/instructor assessment of the project outcomes, and a final written exam on the course subject matter, all contribute to determining a grade for each individual student.

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2. LEARNING COMMUNITIES – OVERVIEW

Online collaboration tools allow communication and cooperation without the traditional boundaries of time and space. Using these tools learning communities can involve participants from different locations, other countries and continents. Asynchronous communication overcomes differences between time zones and allows people to work at hours that fit their personal circumstances. People with very different backgrounds come together online. In online collaborations there is very often a stronger degree of diversity than in face to face collaborations. Two organizations at different locations within the same country usually have different cultures, expectations and standards. On a larger scale this difference of culture can be observed in international projects. While the interplay of cultures is beneficial and offers many learning opportunities it comes with some challenges as well. Particularly in online communities where social presence is experienced less intensively, there is a need to find solutions to engage students in learning activities, self-organize their teamwork and overcome cultural misunderstandings.

Learning communities place the interaction between students, teachers, and other stakeholders at the centre of learning activities. Collaboration typically takes place in distance learning, blended learning or classroom settings with a wide range of technology support. Designers of educational settings have to consider processes, roles, materials used in the processes, and the tools that support the collaboration and production processes. There are many forms of collaboration between teams and this calls for different tools and methods, each fitting to the tasks at hand. Important design questions include: How to use existing technologies effectively in collaborative settings? Which interests of stakeholders have to be taken into account when new materials and tools are designed? What are beneficial interplays of co-located and distributed learning, individual and collaborative learning, content creation and content reception?

Collaboration tools can show the immediate activities of team members but they do not really show what happens behind the curtains. Feelings and the reasons for inappropriate behaviour are often not obvious. A lack of understanding, disinterest in the topic, problems in communication or expectations are more difficult to recognize from a distance without having personal contact locally. Establishing trust and honest communication is harder to achieve without face-to-face meetings. We need to understand and translate different cultural expectations and behaviours.

At the very beginning of an online collaboration process there is little community spirit between the team members if they have never met before. Without strong

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 101–104.

social ties the motivation to contribute frequently to the work tasks may be low. Facilitators are required to foster team building and encourage members to actively participate in the work. The challenge is to balance the inputs and comments of the facilitator between stimulation and domination. In the end teams are supposed to work independently and to be self-directed.

The patterns in this section are derived from two design narratives 'Collaborative course design and presentation' (2.1.1), and 'iCamp international collaboration' (2.1.2). The design narratives are independent, each of them reports on learning communities designing a course using online collaboration tools in an international setting but they take quite different perspectives.

The design narrative 'Collaborative course design and presentation' is about a course that was designed online but delivered in the classroom. Planning, setting the course objectives and collecting interesting materials were performed online by a team of international collaborators. Teachers in rural Nigeria were asking for a course and the motivation of John Dada and Pamela McLean was to provide the best possible course despite minimum resources. Pamela Mc Lean set up a Yahoo! Group and put out a call inviting people to help her and share expertise with her and Fanstuam Foundation in North Central Nigeria. A wiki was installed as a repository for ideas and resources. The design narrative reports that not only was the designed course a success when delivered locally, but that the team members also experienced collaborative learning in the process of designing the course. In fact, the members continued to contribute in their newly created online community even when the design task was finished and the course was delivered.

That the design process of a course is a promising learning experience in itself is one of the premises of the second design narrative, 'iCamp international collaboration'. In that design narrative a virtual learning space for Higher Education Institutions in Europe was created. The students involved in the course had the task of designing a prototype of an e-learning course on a topic of their choosing. In this design narrative both the course design process and the designed course are online activities. The goal was to advance the learner's competence in self-directed learning, social networking and cross-cultural collaboration through individual as well as group work activities. Students from eight different European countries participated in the course and each team contained a mix of members from a variety of cultural backgrounds.

It is noticeable that related, if not similar, patterns emerged from the two independent design narratives. The collaborative design of a course occurs in both and has been documented in the pattern COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY (2.1.1) derived from the design narrative 'Collaborative course design and presentation'. This pattern analyzes the needs and the different roles needed to make the online collaboration for designing a course a success. In its solution part the different roles and stakeholders are described.

The collaboration process in learning communities involves many different types of communication. Hence there is a need for various collaboration tools. Since each

type calls for different features and functions it is imperative to select the tools that are the fit best to the needs and preferences of the team members. This has been recognized in both design narratives. The pattern GROUP HOME RE-LOCATION (2.2.3) describes the forces that need to be considered to select the right tools. While the course facilitators may suggest tools or even set-up tools in advance, it is very important that the team members can still choose the tools they prefer. They should be allowed to replace the collaboration tools if new requirements arise or the first choice of tools turns out to be inadequate for the tasks.

Both design narratives highlight the benefits and challenges of cross-cultural communication, and from each a different solution to overcome cultural misunderstandings is derived. CROSS-CULTURAL MEDIATOR (2.2.2) introduces a new role for a person who is familiar with the different cultures involved. Based on this experience the cultural differences in communication and behaviour can be explained and translated by the mediator. As he/she understands both cultures he/she is capable of empathizing with the feelings of the different team members. Another approach is to organize a LOCAL COMMUNITY MEETING (2.2.4) where students of one location, but of different teams, meet. The students of one location share the same cultural background and may have experienced the same challenges and surprises in their different cross-cultural teams. Discussing their feelings and experiences can help to develop understanding of the behaviours and meanings of the other cultures. Incidents within cross-cultural teams are no longer considered as a problem of the teamwork but rather as an opportunity to learn something about the other culture. Local community meetings can also help to share ideas and solutions by considering how other groups collaborate.

CROSS-CULTURAL MEDIATOR and LOCAL COMMUNITY MEETINGS might be alternative solutions depending on the actual set-up and persons involved. But it is also very likely that both patterns can be applied in combination as the scenario at the end of this section suggests. CROSS-CULTURAL MEDIATORS can strengthen the success of LOCAL COMMUNITY MEETINGS.

Besides the cultural mediator there are many more roles that make cross-cultural online communication a success as the pattern COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY discusses. There is one more important role that has been explicitly described based in the design narrative ‘iCamp international collaboration’: the group leader. The pattern GROUP LEADER EMERGENCE (2.2.5) argues that there is a need for leadership and directions in order to carry out the group work. Since the group should self-organize there is a special need for an authorized leader who orchestrates the group activity. The group leader might be elected explicitly or inhabit the role implicitly. He or she acts as a catalyst and motor for the group and helps to self-organize the group from within. Of course at the beginning there will not be a leader yet. Therefore it is important for the tutor or facilitator to stimulate the participants and provide meaningful suggestions and comments on the contributions of team members. This approach is described in WATCH ACTIVE MEMBERS (2.2.6). This pattern proposes that team facilitators should validate active team members’ contributions

to online discussions using the contents of the teaching material of the course as well as their own professional and academic knowledge. This pattern is about giving meaningful feedback to encourage and direct the discussion and problem solving of the students.

The interplay of the patterns is discussed in a new hypothetical scenario at the end of this section. The question is whether the patterns can help a person who has little or no experience in cross-cultural online collaboration to set up a new course. The scenario introduces a fictive university professor who is asked by her head of department to plan and run an online course about change management. Each of the patterns derived from the two design narratives can be found applied in the scenario.

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2.1.1 DESIGN NARRATIVE: COLLABORATIVE COURSE DESIGN AND PRESENTATION THROUGH ONLINE SPECIAL INTEREST GROUPS NIGERIA, UK, AND A WIDER ONLINE COMMUNITY

SUMMARY

A group of people from various countries collaborated on the design and presentation of an in-service training course for teachers in rural Nigeria. They did so through a Yahoo! Group. This approach of subject experts and course providers collaborating at a distance through an online Special Interest Group (SIG) was further developed for other topics and other learners. This design narrative is based on the Teachers Talking course (http://www.dadamac.net/projects/education-and-training/teachers-talking) and subsequent collaborations (http://dadamac.net/pams-practical-design-patterns).

SITUATION

The first incident in the story took place in 2004, the wider story is still continuing. In 2004 John Dada, director of Fantsuam Foundation (FF) needed to provide a course for the local teachers that would be an interesting and appropriate introduction to ICT (Information and Communication Technology). This was a challenge because the teachers typically worked in poorly resourced rural schools, with few books, no electricity, and no computers. They were completely unfamiliar with digital technology (most had never seen a computer; the local area did not even have a mobile phone network).

John did not have an appropriate local trainer, but he knew me and thought I could do the job. However I lived thousands of miles away and, although I was willing to help, I wanted to update my knowledge before running a course for him (hence the involvement of others through an online SIG).

The locations for the initial story and the ongoing story are:

- Rural Nigeria – where most of the courses have been delivered through the Knowledge Resource Centre (KRC) at Fantsuam.
- The internet – which provides the virtual meeting space for our SIGs for course planning and other collaboration.
- The UK – where I happen to live – however my physical location is relevant only because it is far distant from the KRC (so we must plan via the internet) and

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 105–110.

because I am in a 'bandwidth rich' location (so I have easy access to the internet and can organise SIGs to collaborate online).

The ICT course for teachers was the start of an ongoing story which covers:

– Additional courses for the teachers (where we improved the course content and delivery, and developed the role of SIGs).
– The development of other learning initiatives, through appropriate SIGs, (building on the structures and systems that started to emerge through the teachers' courses).

The special part of the story is the role played by the internet. The emphasis is on the social interaction issues that have emerged during years of working in online SIGs for collaboration on the design and presentation of courses and other initiatives. This design narrative is not simply about technology, it is not simply about collaboration, and it is not about content. It is about developing understanding and experience in the field of 'socio-tech', regarding how people from different cultures collaborate online to support learning.

The 'Introduction to ICT' course for teachers happened for political reasons. Teachers were told they would not be promoted beyond a certain level if they were not ICT literate. They therefore turned to John Dada and the Fantsuam Cisco Academy. However the trainers there did not have the necessary background to design an appropriate short course for classroom teachers.

John asked me to help because we had a history of collaboration and trust (online and face-to-face). Computers in schools had been my area of expertise at one time, in the UK. For reasons of friendship, I had been on working holidays in Nigeria and often done short informal ICT training sessions (known locally as 'computer orientation'). As most of the collaborative work that John and I did was in response to need and unpaid we were able to be creative and flexible.

Online collaboration between the UK and Fantsuam had become easier through the establishment of Zittnet at Fantsuam. Zittnet is the leading West African provider of internet connectivity in rural areas.

I knew what schools were like in rural Nigeria. I also had an understanding of the issues when teachers first meet ICT. However I had become a user of ICT, rather than a trainer, and felt my focus had narrowed. I had a vision for the course John requested, but I wanted help to ensure that the content would be up to date. My instinct was to turn to the internet to find the necessary expertise through creating an online community of interest or SIG.

The continuing situation is that we are continuing to build on what we learned through the initial course for teachers. We have continued to address various training needs where the subject expertise and the potential learners are separated by distance. We have continued to use the internet for cross-cultural collaboration on the design and/or delivery of appropriate training and education.

TASK

There have been a series of tasks related to different training initiatives. In each instance there has been a separation between the location where training was to be given and the person (or people) with the subject expertise to prepare the course (and possibly help, at a distance, during its presentation). We have therefore needed to set up an online SIG each time, in order to discuss the learning needs, prepare appropriate material, and arrange the practicalities of presenting the content to the learners.

Setting up and managing the SIGs is a task in itself. Our SIGs typically include people living thousands of miles apart who encompass various cultural norms. On the Nigerian side there are additional problems of low bandwidth. Our SIG members work in English, a language that is not everyone's language of choice.

The first specific task was to prepare and present the course for teachers. Subsequent tasks have included further, similar, short courses for teachers and a range of other training and education initiatives of varying length and formality.

ACTIONS

In the first instance John invited me to train some teachers and I agreed. We decided on a course, called 'Teachers Talking' (TT) – so named partly because we wanted the teachers to be able to enter into informed debate afterwards.

I set up a SIG to prepare for TT and invited people to join me. People joined from a variety of countries and continents and created a lively online community, using a Yahoo! Group.

The SIG members did much more than I had originally hoped (i.e. to ensure my knowledge was up to date and help me gather some resources). They got very interested in the course context and the realities of rural Nigeria. They created a wiki of resources. They helped with the design and presentation of the course.

Some SIG members came online while the course was in progress to support me and the participants – thus creating a special ICT experience. In that experience the course participants were part of a welcoming online community, with members from other continents, who were supporting the professional development of the participants simply for the pleasure, interest, and learning opportunities provided through belonging to the SIG.

Following TT, I thought carefully about what had happened and the different roles people had played. I made a diagram showing the roles and the information flows between the various role-players. The full diagram included the course participants (the teachers) and people they influenced in their schools and communities, plus people in various roles in the SIG.

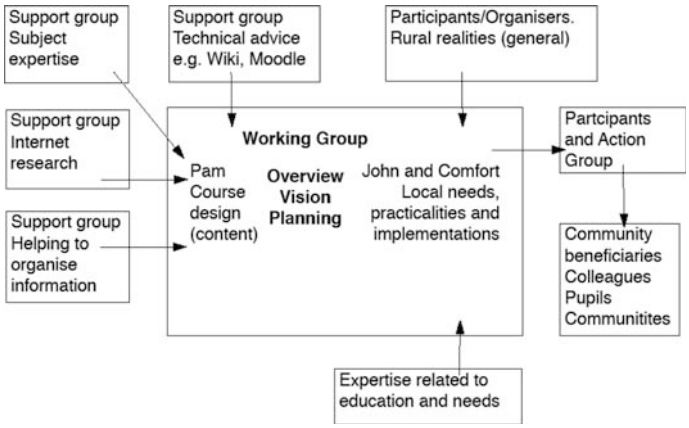

Figure 1. Roles and information flows.

A later, simpler diagram consisted of:

- local expert(s) with general local knowledge
- local expert(s) with specific local knowledge relevant to the training needs
- subject expert(s) with personal expertise
- content provider(s) – searching for additional relevant content on the internet.
- technical expert(s) – helping us to make the most of available technology.

The diagram became a mental checklist for setting up subsequent SIGs where we tackled other information needs. Improved diagrams were created in the light of experience.

Over time, ways for people to engage online also increased (beyond simple emailing and Yahoo! Groups) and we included 'real time' digital communication for collaboration through SIGs in addition to asynchronous communication.

RESULTS

The SIG supporting Teachers Talking continued for several years, reactivating each time a new TT course or event took place. Some course participants went on to run their own version of TT. We initiated an annual online celebration of TT (which has now morphed into 'Dadamac Day'). I included some kind of experience of 'joining a supportive community of interest' in all similar courses.

Work on the TT SIG led to the creation of other SIGs, other training, and the development of Dadamac with its expertise in online collaboration.

LESSONS LEARNED

Regarding the TT course content, we learned that 'TT-online' (interacting with the SIG, and getting information via the members) was very popular. It provided a

meaningful and enjoyable way of 'visiting the internet' for teachers who would not have computers in their schools, but would be telling people about them.

Regarding use of the wiki, we found that teachers needed help in finding resources and generally needed to be guided to specific pages. We have tried other ways of tackling the challenge of making information easily available, with varying levels of success and considerable progress. We continue to experiment and develop our strategies.

The diagram I created after TT turned out to be incomplete. There is an extra role I had not previously noticed, that of 'cultural mediator'. I only realised that role existed when it became obvious in another collaboration that 'something was missing' and I worked out what it was. We have learned the importance of always consciously including a cross cultural mediator to aid communication.

The role of cross cultural mediator is best appreciated through a simple anecdote, which illustrates cultural difference and misunderstanding in small everyday behaviours.

It was my first visit to Africa, arranged at short notice. I knew it would not be appropriate to wear my usual trousers where I was going. My hostess advised me to send my measurements so she could get something made for me. I sent measurements for bust, waist and hips – plus my normal trouser length because I guessed we'd have long skirts.

On arrival I was given two outfits to wear (fortunately they were supposed to be loose fitting). Later I met the seamstress. She took out her tape measure saying the measurement she had been given previously 'had no meaning'.

As she measured me for additional outfits I discovered what she meant. I went to raise my arms so she could put her tape measure round me, but she held my arm straight out sideways. She measured from my wrist to my breastbone, and then down to somewhere near the floor. I certainly had not thought to send those measurements. As for bust, waist and hips – she had no interest in measuring them for the outfits she had in mind. We had been lacking a cultural mediator.

Regarding SIGs, we learned about two-way flows of information and the things that people learn about Africa through involvement in this kind of group. We also learned about managing online SIGs and many aspects of 'socio-tech'.

LINKS

John Dada - http://www.dadamac.net/about/john.
Fantsuam Foundation - http://www.fantsuam.org/.
Pamela McLean – http://www.dadamac.net/about/pam.
Dadamac Days – 6 Years of UK-Nigerian Collaboration
– http://dadamac.posterous.com/dadamac-days-6-years-of-uk-nigeria-collaborat.
Teachers Talking – http://www.dadamac.net/projects/education-and-training/teachers-talking.
Teachers Talking – Yahoo! Group to support teachers in Africa

– http://www.dadamac.net/TT_yahoo_group_story.
Start of the Teachers Talking online Special Interest Group
– http://www.dadamac.net/start-of-tt-online-sig.
Yahoo! Group for Teachers Talking - http://groups.yahoo.com/group/CawdTeachersTalking/.
(Pam's) Practical design patterns for teaching and learning with technology (including subsequent and ongoing collaborations and additional information about initiatives where cultural mediation is relevant) – http://dadamac.net/pams-practical-design-patterns.

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2.1.2 DESIGN NARRATIVE: ICAMP INTERNATIONAL COLLABORATION

SUMMARY

This design narrative describes self-directed learning in international and multi-disciplinary collaborative learning teams. This work was part of the iCamp project (http://www.icamp.eu/) and was carried out in collaboration with Nicole Lotz.

SITUATION

The iCamp project aimed to create an open virtual learning space for Higher Education Institutions (HEIs) in Europe and to advance learners' self-directed learning (SDL) competence. The validation of these goals was realised through several field studies. This design narrative, which is derived from one of the field studies, was implemented as an international, fully online master level module in the spring semester 2008. It was an introductory module on 'e-learning course design' with the goal of advancing the learner's competence in SDL, social networking, and cross-cultural collaboration through individual as well as group work activities. The module consisted of a series of practical hands-on activities and reflective discussions in international groups.

Ten facilitators from seven European countries with different levels of online facilitation experience and 76 students from eight European countries were involved in the field study. The participating students were undergraduates and postgraduates majoring in different fields of information science and the social sciences. They were divided into 10 different groups. Each was supervised by a facilitator and normally did not have more than two students coming from the same country in order to ensure a good mix of cultural backgrounds. Nonetheless, facilitators and students from the same country could interact face-to-face if they wanted or needed to. The module lasted 14 weeks.

The tools deployed in the module were a combination of the learning management system Moodle, various social media tools/services proposed by the iCamp research team and the tools/services chosen by the students. Amongst them, a weblog as one of the recommended tools was heavily used in the module.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 111–116.

TASK

Enhancing reflective thinking was one of the main focuses of this field study. Student participants were required to read as well as reflect on the assigned reading material about the theoretical aspects of e-learning. Furthermore, every week individual students were asked to reflect on their learning process by filling in a pre-defined reflection template. Conversational learning contracts were also adopted in order to foster students' SDL competence. At the end of the module, the students took a critical look at their contracts and reflected on their achievements accordingly. This self-reflection activity and conversations with the facilitator provided the students with some insight into their learning progress and served as a base for self-assessment.

In the field study, another special focus was on cross-cultural collaboration, which was practiced through group work on designing and developing an artefact – a prototype of an e-learning course on a topic of their choice. The students had to coordinate and regulate the artefact design and conversational activities within the group and to find the most suitable tools for mediating these activities at a distance. They were given some flexibility and freedom to choose their reading material, tools and services for supporting their study activities.

ACTIONS

Student participants in groups of seven or eight were collaborating to design an e-learning course under the supervision of group facilitators. They were expected to identify a topic of interest to address for their group project, select relevant tools/services that enable them to communicate as well as collaborate, and devise strategies to achieve the goal of the project effectively and efficiently within the time constraints.

To facilitate establishing collaborative relationships, all the students and facilitators were required to create their own personal weblogs to introduce themselves. Individual weblogs were assumed to be a good means for the students to reflect on their own activities. It was also necessary to have a group collaboration space where the group members, including the facilitator, worked together, shared information, exchanged ideas and collaboratively solved common problems. This space could include one or more different tools.

In principle, facilitators should support the advancement of SDL competence in the students by allowing them as much freedom as possible to work out the group project. However, it was entirely up to the discretion of individual facilitators as to how they would 'guide' their groups. Whereas some facilitators sensed the need to provide more structured guidance to their students (at least in the beginning phase), some others let the students explore on their own right from the start. There was no explicit requirement for having a group leader.

RESULTS

Although the number of registered students was relatively high, in each group only a small number of students were active. These students worked on their required individual tasks as well as contributing to the group activities. Different groups chose their group collaboration space differently. In all groups, the decision was made by either the facilitators or by a small number of active students.

In the beginning of the course, all facilitators recommended their students to select a group collaboration space in addition to their personal blog. There were two cases: (1) in some groups the facilitator proposed a tool such as his/her own weblog or Google Groups that could serve the purpose. For example, one facilitator posted in his weblog 'My blog will be our common tool', (2) in the other groups the facilitator asked the students to identify one or more tools they would prefer to work with and then negotiate which one to adopt. For example, one facilitator posted 'You as a group are encouraged to use also other tools for organizing group work, but you need to propose which tools'.

In the first case, the students tended to accept the facilitators' recommendations. In the second case, some active students proposed their favourite tools. For example, in Group5, a student posted in her weblog 'I wonder what we are going to do with our group space ... I have two suggestions for you: Google Sites and discussion groups'. A few students even did some research on some collaboration tools before recommending them to the group members. In these groups, the other students also tended to accept the recommended tools as the group collaboration space. So in the beginning, four out of ten groups created a group weblog (using Wordpress) as the group collaboration space, one of them also used a Spanish mailing list (www.egrupos.net), two groups used Google Groups together with Wikispaces, one group used both a group weblog and Google Groups, one group selected only Google Groups, one group selected a social network site (www.ning.com), and the last group decided to use their facilitator's own weblog. In addition, the groups also used synchronous communication tools such as specific chat tools (e.g. www.chatmaker.net) or Skype.

As the course progressed, some students came to consider their current tools, including the tools serving as group collaboration space, as inappropriate for their individual and group work requirements. For example, the weblog was not a good tool for group discussions. Consequently, those students voluntarily or involuntarily shifted to other tools, based on the results of their research on collaboration tools, or on the new requirements they chose for the new group collaboration space. For instance, in the beginning, Group1 used Google Groups as the collaboration space. Later this group moved from Google Groups to a wiki as they wanted to use some advanced features of the wiki such as versioning control. Research on features of the collaboration tools was carried out by two active students in this group. One of them posted in his weblog 'When I did a comparison of workspaces in my previous posting [link] ... Because of this, I've decided to favour a wiki over

Google Groups'. As another example, Group2 decided to use a weblog as the group collaboration space from the very beginning. However, later on they would develop their course on a wiki and they shifted their group collaboration space to the wiki. A Group2 student posted, 'Our current collaboration is a group weblog, but soon everything will be shifted to our course environment'. The space shifting may also have depended on the social structure of the group. For example, in Group9, in the beginning the group initiated a group collaboration space combining a group mailing list, a group weblog and a group chat space. However, in this group, only two active students kept on working. Eventually, these two students stopped using the selected group collaboration space. They commented directly in each other's weblog while discussing their tasks, because it seemed much easier for them to work together in this way. As a consequence, the group collaboration space was 'moved' to a new tool, which was the combination of two individual weblogs. In all cases, the students seemed satisfied with their group collaboration space choice.

Whilst identifying a group collaboration space was explicitly required by the facilitators as an integral part of the course work, having a student group leader was an implicit development resulting from a group's dynamics. In analysing the weblogs entries, which serve as the primary data source, it was observed that student group leaders emerged in four groups, vis. Group2, Group4, Group5 and Group9. Interestingly, the facilitation styles varied substantially, with the Group2 facilitator being very active and well-informed (i.e. she was actually sharing the main responsibility of coordinating the whole e-learning course), the Group 4 facilitator was inactive and unenthusiastic, the Group5 facilitator was liberal and democratic (i.e. he was the only facilitator who explicitly encouraged his students to identify a group leader), and the Group9 facilitator was relatively weak (due to her inexperience of guiding online learning groups) and passive (perhaps due to lack of confidence in herself).

In Group5, two students were very active from the beginning, and they decided to select a group leader. One of these two students posted a message in their Google Group 'Glad to have you with us :) Please vote on the group leader'. All the other group members were asked to join the election using a poll. Finally, this active student was elected as the group leader. He acknowledged the support of his fellow group members by the message: 'As the democratically chosen leader of Group 5 :), I'll start with the delegation of our tasks'. During the course, he demonstrated himself as a very strong leader.

In Group2, an active student implicitly considered herself as the group leader. She posted a blog message 'My aim is to become a better team worker, to motivate other team mates as much as possible (this is not an easy job, because sometimes when I took the initiative I felt like crashing into wall)'. In the end of the course, the Group2 facilitator confirmed this student's leadership role, 'It was a great pleasure to have you in my group. You were definitely the soul of this group who kept all of us together'.

In Group4, the group leader was a very active and competent member. During the course, he had been acting like a group leader by encouraging his group-mates and helping them resolve technical problems. Other group members also talked to him as if he was their leader. One of them also acknowledged this observation in his message 'We have no leader, however I think it's [him] ;)), who pushes everybody on forum'.

In Group9 there were only two active members. One of them implicitly considered the other as the group leader. In most cases the group leader defined the tasks for his group member and himself. Such leadership was appreciated by the other active member who posted that 'It would have been more useful if we could have more help to do everything but thanks to [the group leader] I've learnt a lot and I try to do my best'.

It was encouraging to observe in these examples that the students had demonstrated their advancement in SDL competence by managing their internal group organization and regulating the dynamics, with minimal intervention from the facilitator, and in some cases, none at all. In most cases the group leaders were self-selected and their leadership role was supported and substantiated by their peers as well as the facilitator.

LESSONS LEARNED

The advancement of the students' SDL competence was manifested in different ways. The two relative salient ones are their ability to identify and re-locate a group collaboration space contingent on their needs, and the emergence of a group leader triggered by group dynamics.

The group collaboration space plays an important role in facilitating the group activities. However, there seems to be no relationship between group performances and tools for group collaboration space.

In dyads, direct communication between two members seems enough and more efficient

The facilitators and active students play a decisive role in self-directed learning and collaboration. The results show that all group collaboration space selections were made either by the facilitators or by active students.

Students' familiarity with a tool can play an important role in their tendency to adopt it as a group collaboration space, because it is within their comfort zone and the students may be reluctant to spend effort in researching new tools.

Selection of learning tools/services as well as the group collaboration space should be based on some well-defined and convincing learning scenarios as well as on the specific requirements. Some students may also need guidance from the facilitators to select the appropriate tools for their group collaboration space.

A group leader is not given or chosen at the beginning of the collaborative learning process, but a leader emerges through their activity and commitment. Presumably,

one can elect a leader even if one knows nothing about him or her, providing he or she makes a case for becoming a leader. However, in some cases, group members might simply accept whoever volunteers to assume the role. Leadership tends to remains implicit and un-spoken.

OPEN QUESTIONS

- What kinds of online collaboration environments would be more appropriate for a fully online cross-cultural collaborative learning course?
- What kinds of group collaboration space can effectively support group collaboration (e.g. mailing list, web-based discussion forms, or social network sites)? Or is such a space necessary at all?
- Is having a group leader beneficial? If affirmative, then how could we construct/manipulate the environment in such a way as to enable the emergence of a group leader?
- Which facilitation styles hinder or enable the emergence of student group leaders? Which variables mediate the relationship?
- Is there any significant effect of the group leader on group performance? Have the groups with group leaders performed better than the groups without?
- On the individual level, could student group leaders 'gain' more as compared with those who were ordinary group members?

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2.2.1 PATTERN: COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY

SUMMARY

Local course providers (and learners) can be supported at a distance by one or more subject experts, through the creation of a Special Interest Group (SIG) where the members collaborate using the internet**.**

PROBLEM

There are places where there is some internet access, but it is not sufficient to allow learners to learn online (even if suitable courses are available) and there is a learning need but no appropriate local course and no-one able to prepare one.

Forces

- There is a need for an introductory course on a specific subject.
- Someone is asked to arrange it.
- The locally available training courses are inappropriate.
- The local trainers do not have the required expertise to design the new course.
- The course organisers need help from subject experts elsewhere in order to prepare the course.
- The course organisers can find someone to present the course once it is designed.
- The course organisers can go online.
- Subject experts who live in far-away countries (e.g. UK, North America etc.) are willing to help with the course preparation, from their own locations, because of the novelty of the course and its cultural context (e.g. rural Africa).
- The course organisers can provide the subject experts with local expertise regarding the situation and needs of the learners.
- Because of the distance all the preparation has to be done online (in 'the Cloud').

CONTEXT

The pattern is applicable where:

- The training is to satisfy local needs and standards rather than external accreditation.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 117–122.

– Subject expertise is available at a distance from the local delivery point of the course.
– Subject experts are willing to join in without any payment from the course organisers.
– A community of interest or SIG can be assembled to address the learning need.
– The SIG can be set up to collaborate in 'the Cloud'.
– There is sufficient local internet access to enable the local course provider(s), plus location expert(s) and the subject expert(s) to communicate effectively (i.e. everyone can send and receive text messages).
– It will be possible to send any graphics that will be needed for the course, even if most discussions are limited to text.

It is not applicable if:

– There is not enough established trust and goodwill, at the core of the SIG to overcome the difficulties, delays and confusions of working at a distance and across cultures.
– There is not sufficient fluency in a common language.
– There is insufficient ICT leadership to guide the SIG in its use of appropriate online tools and spaces, and to support any SIG members who need additional training.
– It becomes evident that there will not be sufficient resources available to deliver the proposed training (for instance because of the cost of equipment for proposed practical work, or because a key person leaves the group).
– The subject experts and the location experts do not respect each other's expertise and cultures.

SOLUTION

Set up a SIG online, so that location expertise and subject expertise can be combined to create the necessary content and to plan the course delivery.

Set up appropriate structures and systems so that the group members will be able to work together effectively then enable them to start working together in a 'comfortable online space'. For our first collaboration (planning and delivering the first 'Teachers Talking course – an introduction to ICT') we started with emails, then set up a Yahoo! Group to include more people, then developed a wiki to contain the resources that the SIG was generating. As we have gained more experience we have experimented with other tools and set up useful structures in our 'online office' (some visible and some behind the scenes) ready to be used as appropriate. We are using a wide variety of tools now and experimenting with more, but the ones we have found to be most useful so far are:

– Google Docs for both documents and spreadsheets (the spreadsheets serving many non-numerical data-storage and information-processing requirements).
– Drupal and Moodle (not for traditional course delivery, but for managing information for different groups).

– Yahoo! Groups, Google Groups, Skype, and the Worknets chartroom (no longer available) for all SIG members to share information.
– Twitter and phones for messages in addition to the spaces where all the members are sharing information together.

In a way, managing the creation of course content online is similar to managing project based learning in school or college. Creating the course materials is the project, but the people doing the project will have a lot of learning to do along the way – especially if they are new to working in online SIGs.

It is important to consider the possible problems some SIG members will face in using particular online tools, and so it is necessary to be ready to provide appropriate support and training. There are also the obvious extremes of difference in expertise regarding course development, ranging from 'excellent local knowledge but no subject knowledge' to 'excellent subject knowledge but no idea of the situation in which it is required'. The more that everyone accepts that the course design and delivery process is a learning experience for all involved the easier it can be.

As leader of such a group do not focus only on the need to generate course materials, also be aware of the needs of the people in the group, and try to manage their online experience in a positive way:

– Invite people to join the group somewhere simple and familiar to all (such as a Yahoo! Group, or through Skype meetings). Help them to get to know each other and start to feel part of the group before adding additional tools such as a wiki, or collaboration through Google Docs, or placing resources in some other shared online space.
– Have plenty of two way discussion, not just about the subject of study but about the local situation, how the course will be presented, the kind of teaching and learning styles that people use, what the participants will need and be expecting, and so on. Ideally the course members with subject expertise will see themselves as learners as much as they see themselves as teachers.

If you are working with volunteers in the group (as is likely in this kind of online SIG) be aware that different people are there for different reasons, so encourage people to be honest about why they want to be involved. Try to make it as easy, comfortable and rewarding as possible for everyone.

When designing a course consider local teaching and learning styles. Consider also previous opportunities (or lack of them) for informal learning related to the course content. Cultural differences impact on readiness to learn specific skills in particular ways. Subject experts are likely to be well informed about their subject but less well informed (perhaps totally ignorant) about the potential learners, their needs and motivation, their normal learning environment and culture, and their existing level of formal and informal knowledge about the subject. For example, with our ICT courses most subject experts had difficulty imagining life without computers, but most of the teachers participating had yet to see their first computer and that

affected their relationships with information, expectations of being able to find things out, and many other subtleties.

To make the collaboration between cultures a success, a cultural mediator is strongly recommended.

SUPPORT

Source

The source for the pattern COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY is the design narrative 'Collaborative course design and presentation: Nigeria, UK, and a wider online community' (2.1.1).

The pattern is based on a series of five related training courses introducing ICT to teachers and trainers in rural Africa between 2004 and 2008. Each course presentation was redesigned in the light of experience from the previous course. The TT community of interest, or SIG, was long running. It took various forms, and at its peak had about seventy members from a wide range of countries, continents and time zones.

Supporting Cases

There are other supporting cases relating to additional practical collaborative work continuing at time of writing (January 2011).

The collaborative work includes addressing various learning needs of interest to Dadamac (mainly in and around Fantsuam in North Central Nigeria) which we have tackled by setting up online SIGs and accessing expertise at a distance.

Some initiatives have been related to creating courses and some have been for less formal kinds of learning. The learning is sometimes neatly compartmentalised into separate courses (to be delivered in a traditional teacher-learner classroom based way) and other times involves ongoing exchanges of information across inter-related topic areas.

Areas of interest to our SIGs have included:

- Various ICT skills, including social networking, and using digital cameras. Creating the Cameras for Communication course was one outcome of this strand.
- Permaculture and appropriate technologies. Acquiring course materials on bee-keeping and translating them into the main local language – Hausa – was one outcome of this strand.
- Health and welfare. The SIG for the initial development of Peoples-uni (http://www.peoples-uni.org) was one of our health initiatives.

Each initiative has presented new challenges, some more difficult than others. Some initiatives have been successful, some have got stuck, others have been somewhere in between. All have contributed to the pattern by taking us further along our learning curve about running SIGs online, effective collaboration and shared learning.

Theoretical justification

The course design and delivery can be seen as a project-based learning experience where the subject experts and local experts learn from each other (Blumenfeld, Soloway, Marx, Krajcik, Guzdial & Palincsar, 1991).

Both the product and the process of the project-based learning experience are important. Project-based learning can help to build communities of reflective practitioners (Ayas, 2001). The visible product is appropriate course materials. The process generates effective strategies for course development and a skilled cross-cultural team with a foundation of shared experience and trust.

Ideally, the course design is an iterative process. After the first course presentation there should be time for reflection and analysis including feedback from the participants. This all feeds into the next cycle of course design and development.

Verification

This pattern has developed through a period of six years practical work and ongoing analytical thought and reflection on our practice.

Initially, when we started work on Teachers Talking, we were only aware of setting up a subject expert group to update my own knowledge as presenter and to plan the course with the organisers. The fact that the subject experts enjoyed learning about the local context, and wanted greater involvement, was something that emerged as the SIG started working. This interest in being involved influenced the delivery of subsequent courses, the development of subsequent SIGs, and the emergence of Dadamac.

Over the years we have become more experienced in various aspects of online SIGs, including how people in them learn from each other's different areas of expertise (subject expertise, local expertise, teaching expertise, ICT/social-networking expertise).

We have also learned from work in Minciu Sodas (http://www.worknets.org/) which was a vibrant online community created and led by Andrius Kulikauskas from 1998-2010.

The pattern also has relevance 'in the opposite direction' i.e. when initiated by subject experts who have a need for local information.

RELATED PATTERNS

CROSS-CULTURAL MEDIATOR (2.2.2).

REFERENCES

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2.2.2 PATTERN: CROSS-CULTURAL MEDIATOR

SUMMARY

Online collaboration often involves people from two or more cultures. Where these cultures are very different there is often a need to have a facilitator who is aware of the cultural differences and can act as a mediator between the two cultures.

PROBLEM

Cultural difference can cause challenges even when people are collaborating face to face. The challenges are even greater when people collaborate online, because the usual contextual clues about cultural difference are missing.

Forces

- People need to collaborate but, for reasons of distance, cannot meet face to face, so the collaboration will have to be via the internet.
- The people in the group will be drawn from two (or more) different cultures.
- Behavioural norms (politeness, formality/informality, priorities etc.) are different in the different cultures.
- There are apparent, but misleading, overlaps between the cultures.
- It will be hard for members of one culture to understand the other culture without having experienced it.

CONTEXT

The pattern is applicable where:

- Members of a group will be collaborating online, including real-time meetings.
- Some of the people have never visited a place like the place where the other collaborators live.
- It is tempting for participants, sitting at their keyboards in their normal cultural environments, to unconsciously assume that other participants are sitting at their keyboards in similar cultural environments.

It is particularly applicable where:

- The collaborators have never all met face to face, and there will be no opportunity to do so.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 123–127.

– The collaborators have different cultural expectations of how groups of people behave, regarding formality, precedence etc.
– There may be wrong assumptions about cultural similarity.
– It is likely that requests or demands may be made which are easily fulfilled in one culture but are very difficult in the other culture.
– There is a high possibility of cross-cultural confusion (which may or may not be immediately evident) and such misunderstandings are likely to cause delays and lead to disappointing results.
– The collaborators are not all using their preferred language.
– Words that are used may conjure up very different realities in the different cultural contexts.
– Low bandwidth for some members of the group means that exchanges of information (across the full group) are limited to text.
– There may be cultural difficulties relating to the technology – mismatched expectations because of different bandwidth and hardware specifications, high costs of going online, different skill levels, different preferred channels for digital communication, power outages for some, and so on.

SOLUTION

When a group is convened be aware of the cultures represented, and make sure the role of cultural mediator is covered. The cultural mediator needs to be familiar with both cultures, and aware of differences, in order to monitor what is going on, see where the differences are causing blockages in the flow of information, recognise areas of confusion (potential or actual) and make appropriate interventions. The larger the group and the greater the separation between the cultures, the greater the need for a mediator (or mediators):

– It may be that there is considerable cultural overlap within the group, in which case it is simply a matter of someone recognising individuals who are ‘culturally isolated’, taking on the role of cross-cultural mediator, and mentoring them as required.
– At the other extreme most of the team members may only be familiar with their own culture. In this situation there may be a need for each culture to have a strong cultural representative (acting almost like an ambassador) to ensure the cross-cultural understanding necessary to fully include all members of the team.
– There may be a variety of cultural disconnects within a group: country, language, technology, behavioural norms etc. Some differences are less obvious than others, such as those to do with different ways of thinking and personal comfort zones e.g. the cross-cultural academic-practitioner divide or the ‘techie’-‘non-techie’ divide. The important thing is recognising the potential points of cross-cultural disconnect within the group and aiming to have someone acting as the cross-cultural mediator at each cross-cultural connection point.

– When issues need to be addressed this can often be done during the actual online meetings, either directly (by explaining) or indirectly (by questioning about details so that the answers will illustrate difference). Issues can also be addressed outside of online meetings, using whatever communication channel is most comfortable and convenient for those concerned. For example if a new UK member is to join a SIG as a subject expert then, as a cultural mediator, I find it useful to have a long phone call first. Even if I am not able to challenge all the wrong assumptions that I recognise during the call, I can at least point out that 'Regarding what you are expecting, it may not be as easy as you hope it will be for other people to do what you want'.
– It helps that I know the wrong assumption before the subject expert joins the local experts for an online meeting. During the meeting I can ask my Nigerian colleagues specific questions about the local situation – questions that will get answers which can alter the wrong assumptions of the subject expert.

If you are the cross-cultural mediator then consider the comparative benefits of the various communication channels open to you, explore the needs and preferences of the SIG members, and choose accordingly. Low bandwidth can make text the only option, but even within that constraint there are many different options, and using text is not necessarily a disadvantage:

– Text is sometimes better than speech for people who do not have a shared preferred language and have problems understanding each other's accents.
– Text meetings have the benefit of generating an automatic complete archive – it is helpful for cultural mediators to check the archive after a meeting in order to pick up areas of possible misunderstanding at an early stage.
– Text meetings make it comparatively easy for the cultural mediator to do mediation interventions in parallel with the main meeting, e.g. send a text, make a quick phone call or run some parallel one-to-one Skype or Yahoo! chats.

The cultural mediator should be aware of the dangers of group members having a shared language but different cultural contexts. For example, during a UK-Nigeria meeting someone in Nigeria mentioned a library, someone in the UK responded enthusiastically, and started to build on that information. I phoned him immediately to say 'Your idea of a library isn't what they're talking about' and we agreed to discuss it in more detail after the online meeting had finished.

The UK contact was thinking of a large building with books to take away – an idea that was altering his notion of the size of the compound where the project was placed. In fact, on the Nigerian side, people were referring to a multi-purpose room with two or three shelves on one wall. Anyone who wanted to sit and read the books that were kept on those shelves was welcome to do so i.e. to 'use the library'. Everyday words like school, shopping, electricity supply, bath, tea, photocopying, photo, police, road, farm, home, family, water, journey and many more are open to similarly mismatched understandings.

The cultural mediator should be aware of the preferred communication channels of the various group members so those channels can be used appropriately for additional contact. For example, in Dadamac SIGs we use various channels for extra personal communication, including Twitter direct messages, personal emails, phone calls (often preferred by group members in the UK), text messages, and internet instant messaging (IM). Some people prefer Yahoo! for instant messaging (available in most cyber cafes) others prefer Skype (IM is often preferred by group members in Africa who dislike emails for a number of good reasons). This personal approach is worth doing sometimes in addition to the group approach because people tend to respond better via their preferred communication channel.

SUPPORT

Source

The source for the pattern CROSS-CULTURAL MEDIATOR is the design narrative 'Collaborative course design and presentation: Nigeria, UK, and a wider online community' (2.1.1).

Supporting Cases

This pattern is based on ongoing work in various fields by Dadamac. Almost all our initiatives include a degree of cultural mediation, and we continually review and analyse the complexity and subtleties of the cross-cultural mediator's role.

Theoretical justification

The importance of good practices in the design of cross-cultural collaboration is highlighted by Schadewitz (2009). Many studies show the importance of cultural influences in the design of computational systems, products and services (Marcus, 2005). Likewise international collaboration becomes more and more important in educational contexts (Cheng, 2003). Misunderstandings and breakdowns occur more frequently if there are large cultural differences (Adler, 2002). To overcome the differences this pattern suggests a mediator who can harmonize the understanding between the heterogeneous teams.

Verification

The pattern was tested and developed during several Dadamac cross-cultural collaborations, most notably:

– Teachers Talking (various versions in Nigeria and Kenya)
– Peoples Open Access Education Initiative (Peoples-uni)
– the planning of a technology-transfer project (the eco-dome)

– some photography courses (especially Cameras for Communication)
– preparation of a collaborative funding bid for a business feasibility study and related field testing of prototype equipment for recycling waste plastic (with City University and Developing Technologies).

RELATED PATTERNS

This pattern supports the pattern COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY (2.2.1)

LINKS

(Pam's) Practical design patterns for teaching and learning with technology (including subsequent and ongoing collaborations and additional information about initiatives where cultural mediation is relevant)
– http://dadamac.net/pams-practical-design-patterns.
Peoples Open Access Education Initiative: PeoplesUni.org
– http://www.dadamac.net/initiative/peoplesuniorg-proof-concept.
Special Interest Group for the initial development of PeoplesUni.org
– http://www.dadamac.net/node/184.
Eco-dome
– http://www.dadamac.net/initiative/ecodome-attachab.
Cameras for Communication
– http://www.dadamac.net/initiative/cameras-communication-c4c.

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2.2.3 PATTERN: GROUP HOME RE-LOCATION

SUMMARY

Groups need a shared collaboration space for group work. The space selection and re-location depend on the facilitators and on a few active students. This pattern was developed in collaboration with Effie Law and Nicole Lotz

PROBLEM

In collaborative learning situations the students usually work in groups or teams to design and develop a shared artefact or to solve a common problem. To facilitate the group work groups need a virtual space, which can be seen as group home, where the group members, including the facilitator, can work together, e.g. to get information about the other group members' activities, to coordinate the group activities, to share information, to exchange ideas and to collaboratively work together. Without a 'home', the group collaboration may not exist or may be more difficult.

Forces

While the institutions and the course organisers may offer the core tools, individual students as well as student groups need to choose from a growing variety of available tools that might help them carry out the collaborative learning activities.

The group home may not be provided by the learning institution. However, it is usually recommended by the facilitators to help groups work more effectively and efficiently.

Some facilitators and/or some students may have a strong opinion about the use of one or more particular collaboration tools.

On the one hand, the collaboration tools may not have all the characteristics and features that are appropriate in all collaborative learning situations. On the other hand, it may take time and effort to discover and learn about the characteristics and features that could be useful. Consequently, the collaboration tools research and selection is usually carried out by the facilitators or by a few active students.

Students may not predict all the learning situations, and so they may need to adopt a new tool later as the course progresses.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 129–132.

CONTEXT

This pattern can be applied to online collaborative learning situations in which the groups/teams need to adopt the tools that support group work. It may not work in learning situations in which group work is not needed, for example, a student working individually in an online course.

SOLUTION

Find an appropriate location to set up a group space (i.e. group home). If the students are passive the facilitator should encourage the students to do this. Other students may join in later and work on the group home too. There are two possible cases as follows:

- The group facilitator recommends a specific tool such as a group blog or a social networking site. The students can accept the facilitator's recommendation or they can do further research to find the tool appropriate for them.
- An active student, encouraged by the facilitator, takes the initiative to identify and set up a group space and recommends one or more specific tools to other students.
- The tool recommendation is based on the facilitator's or student's perception of its usefulness, usability, or familiarity. The acceptance and use of the recommended space is based on strong arguments in favour of this tool.

The group can choose a new group home as the course progresses if the current group home does not satisfy the new requirements raised by a new learning situation, and if the students can find other tools that are more appropriate in this new situation. The group home may also be shifted involuntarily if the group structure is changed. This moving/shifting of the group home is usually recommended and decided on by one or more active students. Usually, the decision to move to a new home is made at an early phase of the course, where the time and effort of the group to move to the new home is still acceptable.

If no strong opinion in favour of one tool emerges, then it is less likely that a group space will be set up. In that case, the group of students will be mostly working in cooperation mode.

The group home recommendation, acceptance and use are based on the strong arguments proposed in favour of this tool. After locating or moving to the (new) group home, all group members need to be informed and prepared (e.g. create new account). It may also take time and effort to discover and learn about the new interface as well as the characteristics and features that could be useful. In addition, some project artefacts (e.g. shared documents, previous discussions) will need to be moved to the new space.

In groups of two, direct communication between those two members seems more effective and efficient.

SUPPORT

Source

The source for the pattern GROUP HOME RE-LOCATION is the design narrative 'iCamp international collaboration' (2.1.2). In Group2, the group facilitator asked her group to work on a shared space, which was the group blog. The Group2 students accepted their facilitator's recommendation. In Group1, the facilitator asked her students about setting up the group home in some of her early posted messages. Then some of the students in the group did a review of different collaboration tools and finally they chose Google Groups. However, as the group work progressed, they decided to move to a wiki as they realised that Google Groups did not provide good support for the way they wished to collaborate. Actually, one active student did some pretty thorough research on collaboration tools and the group decided that, compared to Google Groups, a wiki could provide them with more collaboration functionality. In Group5, a student proposed the use of a group space (Google Groups) in a message. There was no objection from other group members and then they worked together in that group space. One should bear in mind that all the group home moving took place at an early stage of the course, so although the groups opted to gather new content on the new home, the loss of old content was acceptable.

In another international collaboration project between students from Hong Kong and Korea, students were originally assigned a Yahoo! Group space, but some students did not use it after the initial set up. They argued it was not user friendly and a combination of server space, where large files can be shared, and instant communication tools did a much better job at creating a shared group space, and so they relocated all their work to these tools.

Theoretical justification

The role of shared spaces in collaboration has been discussed in many Computer Supported Collaborative Learning and Computer Supported Collaborative Work research studies. We can refer back to Wenger's concepts of communities of practice (Wenger, 1998) in which he defined negotiation of meaning as a process in which people interact with each other and engage in the community. A so-called 'shared repertoire' is created through the community interaction over time. Such perspectives allow the examination of the dialectical relationships between the learners and their social environment (Ponti & Ryberg, 2004). In traditional learning, classrooms are a place where a structure of social interactions develops and evolves and where a number of events happen and influence students' behaviours (Ponti & Ryberg, 2004). In an online environment, a virtual space can still play the role of such a place, a place that affords social interactions and learning activities. That explains the need to have a 'home' for group work in online learning environments. However, software tools, which are designed to serve as a virtual space for collaboration and communication, may fail to foster and sustain conditions that support a social

context (Kreijns & Kirschner, 2001). In addition, even for the same tool serving as a space, there may be different patterns of use depending on the ability to participate, and adapt and appropriate the use of the tool by the user communities (Harrison & Dourish, 1996). This explains why some groups were happy to use a specific tool (e.g. Google Groups) while some others preferred another tool.

RELATED PATTERNS:

WATCH ACTIVE MEMBERS (2.2.6)
GROUP LEADER EMERGENCE (2.2.5)

REFERENCES

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2.2.4 PATTERN: LOCAL COMMUNITY MEETING

SUMMARY

Frequent local community meetings support students and facilitators in understanding online behaviour of remote teammates in international distance learning. This pattern was developed in collaboration with Effie Law, and Anh Vu Nguyen-Ngoc.

PROBLEM

Particularly in international collaborative projects in distance learning, the online facilitator might be from another University than the students in the learning team. The facilitator might have never had face-to-face contact with these students. Hence, the facilitator might not fully understand the local circumstances that impact on a student's participation in teamwork, such as personal situation, or cultural presumptions. An online facilitator might not know the reasons why students fail to contribute to distributed teamwork. In addition, students from other universities might not trust these online facilitators as much as their local tutors from their own university. This lack of knowledge and trust can have devastating effects on the teamwork process. Students become dissatisfied with the team and drop out of the project.

FORCES

International facilitators only see the online behaviour of their remote students, such as missing contributions to teamwork. However, they might not be able to identify the underlying reasons for this behaviour, such as illness, problems in communication or expectation, or cultural misunderstandings. Real reasons for online behaviour might be disguised.

International facilitators might only have one or a few students in their team who are from their own university. At the same time, other students from their university are distributed in other teams.

Students are more likely to trust their local tutor based on a shared culture, shared profession, and shared local language than the online facilitator, who might have a different background, and this creates barriers to free and honest communication of potential problems in teamwork.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 133–136.

CONTEXT

Whenever students are involved in inter-disciplinary and inter-university teams, this pattern can be applied. This pattern particularly applies to international collaborative e-learning projects between students from different universities. At least one student per university is in a team. Hence each team consists of students from all participating universities. A tutor, who is usually an academic from one of the participating universities, is assigned to facilitate the international team. So this tutor may only have one student in the team with who they have been or can come in contact locally due to their shared university association, all other students can only be contacted online.

SOLUTION

Each tutor initiates frequent but voluntary local meetings with all students who participate in this international e-learning course. Although these students might not be in their team, they share a cultural background, which allows them to communicate informally and openly about the collaboration process in their international teams. Potential problems in online collaboration can be discussed among local peers and with the local tutor who also has the experience of collaborating online, as they are also online facilitators. On one hand, the students have a community support through exchanging experiences with their local peers. On the other hand, local tutors can learn about successful strategies that other teams and tutors applied in their collaboration.

Both students and tutors learn how other groups collaborate. This can address both technical and social concerns. Moreover, the local tutor might be able to resolve local situational constraints that limit local students in contributing to online collaboration. The local tutor might also better understand the reasons for the student's online behaviour where these are based on cultural differences.

The solution can be implemented by advising local tutors who are also online facilitators to offer voluntary local meetings to students from their university who take part in this international project. The frequency of the meetings depends on the length and requirements of the project. This should be decided by the local tutor but can be negotiated among all facilitators in order to allow a fair treatment of all participants.

The solution presumes that local tutors and co-students will spare the time to get together locally. This also involves extra workload for the local tutor unless such meetings are an integral part of the international project from the beginning and time to conduct such meetings is planned. However, voluntary meetings are more effective because they come across as less formal and hence encourage more open communication.

The rationale of this pattern is that local students can exchange experiences and, if necessary, troubleshoot technical and social issues in online collaboration with international partners. However, a side effect of this might be that some students develop a fear of lagging behind in teamwork compared to other teams, or they want to outdo or show off how well their teamwork is going. In one international

collaboration in design learning we saw an example where students became de-motivated when they got to know how well another team was doing in comparison to their own team. This competitive mood might produce some tensions in online collaboration in the teams. In this example, the team used the comparison as argument to push the partners to work faster, which ignited discussions around different ways of working in teams, which had the effect that the team fell out.

The solution can also carry a potential risk that opinions and views aired in local community meetings override or contradict advice from the online facilitator or other online team members. This might happen if the local tutor who chairs the local community meeting had not had the chance to talk to the online facilitators previously to become aware of potential problems or controversies.

An extension to this pattern is instigating regular online meetings of online facilitators from different universities to discuss difficulties or progress in their international teams. Here, online facilitators can get to know about local conditions directly from local tutors. They can also discuss strategies to deal with potential problems in their online team.

SUPPORT

Source

The source for the pattern LOCAL COMMUNITY MEETING is the design narrative 'iCamp international collaboration' (2.1.2).

In this design narrative, a tutor from Croatia reported that: 'I met my Croatian students a few times during the semester (three or four times). Discussions were mainly about their status in the group, obligations, problems and opinions. The main goal of these meetings was to motivate them and to try to solve some problems if necessary.'

In the same design narrative, a tutor from Finland confirmed that they also had voluntary, informal meetings. The tutor advertised the meetings to the local 'OULU' students offering a platform for discussion with the teacher or with their group members. There were 4-9 students present from all groups each time. Mostly they advised each other on specific issues like how to start getting RSS feeds from other group member's blogs. Each time they met and dealt with very practical issues and discussed how specific challenges in the course could be solved. This tutor tried to say very little and let the students solve the challenges themselves.

Another tutor from Tallinn University reported in week 4 of the project: 'This week I learned that if students disappear, the only thing that works is not distant prompts by mail but local people who can help you out. We all need some support, sympathy and understanding from real humans when we get stuck. […] The main question is how to reach those group members who are not active. Local facilitators and local peer help was helpful to figure out why people are missing'. This supports the approach suggested in this pattern of using a local community to understand the reasons for online behaviour.

Theoretical justification

In-group and out-group bias and group discrimination could explain this pattern. If membership in a group (even if groups are randomly assigned) is established, people in the same group are often treated more favourably than people in the out-group (Tajfel, 1982a). Tajfel also reported that multi-group membership can improve inter-group relations and reduce possible conflicts (Tajfel, H., 1982b). In the iCamp example students and tutors were part of multiple groups and that decreased intergroup discrimination.

Some argue that a sense of place and belonging to local communities still plays a strong role in distributed computer-supported collaboration. Research confirms that online and offline communities are interweaved (Wellman et al., 2002). They also reported that communities are built by a mix of online and offline interaction around the world in very similar ways. However, if the concept of community, social engineering and mode of communication are not appropriate in the online environment, participants do not aggregate and build a critical mass for online community building (Arnold et al., 2003).

RELATED PATTERNS

It is possible that active team members encourage online community building. Local community meetings in which these active members can share their strategies with other co-students and tutors can support their role online. This relates to the pattern WATCH ACTIVE MEMBERS (2.2.6).

Local meetings allow students from other teams to exchange experiences with online teamwork which can positively influence self-organizing techniques such as described in the patterns GROUP LEADER EMERGENCE (2.2.5) and HOME RE-LOCATION (2.2.3).

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2.2.5 PATTERN: GROUP LEADER EMERGENCE

SUMMARY

A group leader emerges in self-directed learning situations through the influence of steering by a facilitator. This pattern was developed in collaboration with Anh Vu Nguyen-Ngoc, and Nicole Lotz

PROBLEM

There might be difficulty in carrying out the group work without clear goals and direction. Effective and efficient group work in learning needs direction and leadership.

Forces

One or more group-based task(s) needs to be achieved by a certain time and at least two members in the group want to accomplish it.

The task should have a certain level of complexity that entails some form of cooperation and collaboration.

Group members have different approaches to completing the task which necessitates negotiation, compromise and decision making.

While some group members are very active, others are passive and really need a 'push'.

One student needs to be active, but this alone does not make a leader. There also needs to be explicit recognition of leadership by the facilitators and/or other less active students.

The emergence of a group leader does not seem to be contingent on the facilitation style (i.e. proactive, reactive, or inactive).

Explicit encouragement of a facilitator may expedite the process of identifying a group leader.

Several co-existing conditions may favour the emergence of a group leader:

– Case 1 – (i) a weak facilitator – inactive and inexperienced; (ii) a very active member; (iii) some group members intend to bring the teamwork forward but need directions.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 137–138.

– Case 2 – (i) a strong facilitator – active, experienced and eager to foster self-directed learning competence in the students or the facilitator wants to delegate his/her supervisory role to a student so as to mitigate his/her heavy workload; (ii) an active member with explicit support from the facilitator; (iii) some group members intend to bring the teamwork forward but need direction.

CONTEXT

The pattern can be applied in international multidisciplinary collaborative e-learning. A group project needs to be accomplished under the supervision of a facilitator. Advancing self-directed learning competence is an important goal of the project.

SOLUTION

The facilitator explicitly or implicitly encourages the group to select a group leader.

The facilitator sets the stage (conditions) for a group leader to emerge by emphasizing the course's goal of exercising self-directed learning (SDL) competence, suggesting the need for a group leader, nominating a possible leader candidate (communicating the nomination privately to the candidate or to the whole group to yield public support) and explicitly recognizing the candidate's strengths.

The leader works closely with all other members, and can distribute the tasks amongst the group members.

SUPPORT

Source

The source for the pattern GROUP LEADER EMERGENCE is the design narrative described in 'iCamp international collaboration' (2.1.2).

RELATED PATTERNS

WATCH ACTIVE MEMBERS (2.2.6).

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2.2.6 PATTERN: WATCH ACTIVE MEMBERS

SUMMARY

Self-organisation in learning teams is supported by active team members providing justified suggestions which are confirmed by the facilitator and supported by less active members. This pattern was developed in collaboration with Effie Law, and Anh Vu Nguyen-Ngoc.

PROBLEM

Every learning team develops team dynamics based on the mix of its members' personalities and expertise, the course learning goals and the technologies involved to support teamwork. It is difficult to plan for all possible configurations and effects of these dynamics in advance. You need to let the team self-organize, but you also want to support it in critical situations. In collaborative learning situations where students and tutors don't know each other beforehand team compositions are often imbalanced. This leads to the problem that only one or a few members actively contribute in teamwork, or that team activity dies out due to no response from less active or inactive members. However, it is dangerous to assume that the more active members will take care of themselves and continue contributing if there is no reaction to their activities.

Forces

Group members don't know each other previous to joining the course but they need to work in a team to reach the course goal and objectives. The facilitator/tutor wants to support the team building but does not want to guide the team organization strongly. The learning objective of the course is to promote self-directed learning and self-organization of a team.

Active team members are the key to successful team self-organization. They quickly take up the facilitator's suggestions or initiate activities that help the team to self-organize. It is important that less active students know that conclusions, suggestions and actions by active students are justified in the learning context.

Self-organizing teams will always contain team members who are more active than others and who suggest resources and tools or coordinate activities. However, these students might quickly dominate the team activities.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 139–143.

Team self-organization builds on a very delicate dynamic between active members, less active members and team facilitators. In self-directed learning the facilitator does not lead group work but encourages participation. It is often more difficult to encourage participation by less outspoken, insecure or shy team members. However, not all contributions by active members are valuable or help the team to self-organize.

CONTEXT

The pattern can be used in distributed collaboration and teamwork where self-directed learning is promoted or is the learning objective. Students are supposed to self-organize their team, including choosing tools for collaboration, tasks, roles and goals. A tutor might be assigned to each team. However, they are not meant to guide the students strongly through their learning process. Facilitators help the team if it is stuck and redirect team activities slightly into a better direction if the team is off-track. The facilitator's support of self-directed teamwork is implicit rather than explicit.

SOLUTION

The facilitator validates active team members' contributions to online discussions using the contents of the teaching material of the course or using their own professional or academic knowledge. The facilitator could be using theories or models from the learning materials to encourage the uptake by the team of an active member's contribution. This can happen in forum or blog posts or web tutorials. The facilitator could also take part in an activity that was initiated by an active student to show the validity of this to the team. For example, if an active member suggests reaching certain project objectives (e.g. target audience for the project solution, or ways of working in the team) and other students are uncertain whether those objectives or ways of working are realistic, the facilitator would positively validate using their knowledge or make alternative suggestions. It is important that the facilitator does not simply say: 'Yes, do it this way', but that they explain the pros and cons of the suggestion and a discussion is started amongst the team. The facilitator's validation can act as a good example for other, less active, members to follow this or make other suggestions. It also builds confidence and trust in the active members.

Watching the active members' contributions and responding to these encourages them to continue taking responsibility and being active members. Contributions acknowledged by a tutor or facilitator will also be accepted and supported by all other team members. Watching the active members in this way will reduce uncertainty in teamwork and lead the team to self-organize including using strategies such as supporting the emergence of group leaders and choosing/shifting a group home.

There are possible contra-indications and situations in which this solution might not work well. If the active team members' suggestions are not endorsed, i.e. not responded to or taken up by others, the team will not self-organize. Less active

members might not want to publically object to the active member. However, if there is no reaction at all active members might refrain from contributing and the team will not self-organize. Alternatively, for example, the active member might continue spamming the team with ever-new suggestions, which might not be viable. In all these cases, the facilitator needs to scaffold and re-direct team activities.

There are a number of possible extensions to this pattern. For example, if the contributions of active members cannot be validated or justified by the course materials, or they go against the course culture or learning goals then the facilitator needs to use a more directive approach to guide the team in a more appropriate direction. In the same way, if less active team members do not respond to the active members' suggestions, the facilitator needs to take on another, possibly more directed, strategy to involve all in the group work. Another way to support active members is to encourage others to be more active too, if situations allow, e.g. taking on a specific role or task in the teamwork. Although this pattern suggests that the facilitator has to watch active members, less-active members should not be left behind. An extension to this pattern would be the more explicit involvement of less active members based on the more active members' suggestions for team action.

The pattern LOCAL COMMUNITY MEETING might be applied when the facilitator cannot get the less active students to respond to the more active students' suggestions.

SUPPORT

Source

The source for the pattern WATCH ACTIVE MEMBERS is the design narrative 'iCamp international collaboration' (2.1.2).

A tutor from Tallinn University reflected in a blog that she wrote during the project that it is difficult to comment on students' posts: 'I found it quite interesting to think of the posts students wrote as assignments. It is not trivial what I, as a facilitator, should reply. Somehow it seems to reply 'Well done' is not enough.' The tutor used her blog to reply to a post of a student to explain why the student's suggestions are valid and good for the team. In this particular instance, the project assignment was to design distance learning materials. The student made a comment on how to motivate learners to study online materials. To validate his point, she had consulted some theory on intrinsic motivation in learning and commented using this theory on the active student's suggestion. In this way she implicitly validated the student's suggestions and inspired other students to follow this suggestion. She did not just say 'Well done' but explained for all why this is a good point, but she did not say you all have to do it in the same way, she put the power for self-organization into the group and let it not rest with her.

In a second example, after a student from another group took action to get the team going by setting up a new group space (in Google Groups), the team facilitator from Croatia posted into this space and hence implicitly validated the active student's step as positive, giving a good example for others to follow.

Theoretical justification

This pattern builds on the theory of constructivism in learning (Piaget, 1950) and resulting active learning strategies, which construct dynamic relationships between active learners and the facilitator, who encourages activity by giving positive feedback on the actions taken. The facilitator continuously adjusts and re-structures activities (e.g. Meyers & Jones, 1993). The pattern also relates to the theory of formative feedback. A tutor or facilitator uses the learning material to inform the feedback on an active student's post and hence give formative feedback, and also guides the team indirectly in the right direction. This is an example of key strategy 3 'Providing feedback that moves learners forward' described by Black and Wiliam (2009).

The pattern describes the facilitation strategy of scaffolding which is a well-known theory in education (Wood, Bruner & Ross, 1976). Researchers have found that facilitators can use implicit and explicit methods of scaffolding in self-directed learning (Hadwin & Winne, 2001; Butler & Winne, 1995). They need to dynamically assess the context and composition of the learning situation to make decisions about whether to use implicit or explicit (more directive) scaffolding (Azevedo et al., 2005). In this pattern, implicit scaffolding is used in watching and supporting active learners, but for less active learners a more explicit scaffolding strategy might be chosen.

RELATED PATTERNS

GROUP HOME RE-LOCATION (2.2.3): This could be described as a sub-pattern of WATCH ACTIVE MEMBERS. It describes a solution that uses an active member's initiative and the facilitator's judgement to adopt new tools for online collaboration during teamwork.

GROUP LEADER EMERGENCE (2.2.5): This sub-pattern of watch active members explains the emergence of group leaders in self-organizing teams in self-directed learning environments.

NO TELLER WITHOUT LISTENERS (3.2.8): A storyteller needs listeners who legitimate the relevance of the story by giving attention, non-verbal feedback or small agreements. Active members can be storytellers whose stories are validated by less active members and facilitators.

SOFT SCAFFOLDING: Technologically supported learner support should not be too rigid and should adapt to the learning rather than guiding it strongly (Mor, 2010).

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2.3.1 SCENARIO: LEARNING COMMUNITIES

SITUATION

Nadine is a young assistant professor at an internationally recognized business school. Her special interest is change management and she has published several journal articles on that topic. While she is a well-known expert in her field, she has not much experience as a teacher yet. But she is very motivated to provide the best learning experience to her students. One day the head of her department comes to her and suggests she should run an online course on change management for small companies. The course is supposed to be a joint venture with some of her school's partner universities. It will be open for students who are close to their exams. There should be at least five universities involved. At her own university the course will earn the students 12 ECTS. Nadine has three months to prepare the course which will start in the next semester. During the semester she will have about 8-10 hours per week to provide lectures, online support, course materials and assistance. On her site there are two student assistants who will help out particularly in answering questions online and stimulating discussions in the forums. She has access to the learning management system Moodle which is in use at her university. However, from previous experience she knows that the administrators do not like to create accounts for non-university members. She could find a new learning management system, set up her own, or struggle with the administration to create the user accounts. Nadine is aware that the course needs to be a success because the university administration puts high expectations on the project. At the end a summative evaluation will be carried out by the education department.

TASK

The objectives of the course should cover the state of the art as well as new research findings. Students should be engaged and motivated to do their own investigations in teams. The learning objectives include social skills and cross-cultural team experiences as well as the concepts of change management. Nadine has to initiate the contact with the partner universities and propose the new online course. It is her job to negotiate a curriculum that meets the expectations of the different partner universities. The course materials and assessments have to fit the local standards in order to let the students earn credit points at their university. As an international expert in her field Nadine will prepare most of the materials that will be taught in

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 145–150.

the online course. However she is aware that each of the partners will have different interests and priorities. Her case studies and examples in particular need to be adapted in order to be meaningful in each of the countries of the partner universities. The examples and activities should work for all students because the teams will consist of members from different universities as cross-cultural experience is one of the learning objectives.

The following forces can be seen to be impacting on this task in the given situation:

- Nadine is an expert in her field but she has only a little knowledge about cultural differences.
- The course has to meet the local standards to earn credit points.
- To make the content of a course meaningful, the examples and case studies have to be localized, but Nadine does not have any local examples available.
- The time to create the course is limited but the quality of the course has to meet very high standards.
- The workload in preparing the course needs to be distributed.
- Students have to be engaged to learn about the domain and cultural communication.
- Students with different cultural backgrounds may find it difficult to adapt to the expectations and behaviours of other students.
- The time demanded to prepare and run the course is already significant. Investing time to settle misunderstandings would increase Nadine's workload even further. Moreover, her own understanding of the cultural differences is limited.
- Students should find their own ways to resolve misunderstandings because cross-cultural communication is an explicit learning objective.
- If students get frustrated too early they might drop the course or participate only at the lowest level.
- Both teachers and students need to feel comfortable with the collaboration tools in use.

PATTERNS

The young assistant professor identifies the following patterns that could help her in implementing the online course:

- COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY (2.1.1) suggests that the new course should not be developed in isolation by a single course director.
- A CROSS-CULTURAL MEDIATOR (2.2.2) will help all stakeholders to understand each other better during both phases (designing and running the course).
- GROUP HOME RE-LOCATION (2.2.3) helps to find and maintain an appropriate virtual workspace for designing and running the course.
- LOCAL COMMUNITY MEETING (2.2.4) lets students share their experiences and approaches in cross-cultural communications with peers from their own culture.
- GROUP LEADER EMERGENCE (2.2.5) and WATCH ACTIVE MEMBERS (2.2.6) stimulate the self organizing of the group.

SOLUTION

Nadine sets up a workspace for an online learning community to discuss the needs and the design of the course together with all partner universities. She invites professors from each university to participate in the course design. To make this process a success, each partner is assigned to one or more roles as the pattern COURSE DESIGN AS A COLLABORATIVE LEARNING ACTIVITY advises. While each of the roles is required to make the collaboration a success, the assignment clarifies what is expected from each of the partners. Nadine is the course initiator and director envisioning the outline of the online course. She does not only provide her expert knowledge but learns a lot about cultural differences. The variation of new examples is very fruitful for her research. The extra time spent in designing an international course pays off not only as an innovative learning setting but as an interesting source for new knowledge as well.

In the beginning Nadine suggests several tools for online communication and documentation of the course design and current project state. But some project partners know other tools that better fit the tasks at hand and in the process of designing the course new functions are required. The pattern GROUP HOME RE-LOCATION tells us that the recommended tools should be based on the perceived usefulness, usability and familiarity. The group can choose a new group home as the course design progresses if the current group home does not satisfy the new requirements raised by a new situation and if the participants can find other tools that are more appropriate in this new situation. This is true for both the group of professionals who design the course and the group of students who will be involved in the course eventually.

While the communication between members of different cultures is interesting and inspiring, problems can easily arise due to different expectations and misunderstandings. Such misunderstandings and differences in views are often a source for conflicts. But there are ways to escape this misery. The pattern CROSS-CULTURAL MEDIATOR suggests including a person in the project who is familiar with both cultures in order to monitor what is going on, recognise areas of confusion (potential or actual) and make appropriate interventions. For each partner university a member of the staff is found that has spend a considerable time abroad in one of the countries of the other partners. The cultural mediator is not required to be an expert in the subject but should be interested in cultural exchange. While running the course, each student team is asked whether one of the students has been in one of the countries of the partner universities. If so, he/she will be assigned the role of the cultural mediator. However, very often students do not have this experience. A good solution is provided by the pattern LOCAL COMMUNITY MEETING. The partner universities initiate frequent but voluntary meetings with all students who participate in this international e-learning course. This is not a team meeting because teams consist of members from different locations. Rather it is a meeting of all students with the same cultural background. Hence, they will have similar feelings about the collaboration process and this allows them to communicate informally and openly about the collaboration process in their international teams. Discovering that

different students have the same experiences illustrates that unexpected behaviour is very often of cultural and not of a personal nature. A cultural mediator could further explain the customs. Usually there will not be enough cultural mediators to equip each team with one but organizing a local community meeting only requires a single cultural mediator for each location.

Since the online course runs across several cultures in virtual space there is a need to stimulate the self-organization of the group. The pattern WATCH ACTIVE MEMBERS suggests monitoring the collaboration process. The contribution of active team members should be validated or commented on by the facilitator. The facilitator accompanies the collaboration process as a guide who encourages the students to participate and provides suggestions for alternative directions. Over time, the directions given by the facilitator fade more and more as the group starts to self-organize. Typically, a group leader emerges over time. GROUP LEADER EMERGENCE should be encouraged by the facilitator implicitly or explicitly. Once the group leader is in charge he/she will organize group activities and identify the direction to be taken, backed up by the whole group.

DISCUSSION

The patterns help to overcome both distances on the map and in cultures. The patterns CROSS-CULTURAL MEDIATOR and LOCAL COMMUNITY MEETING are two ways that can easily be combined in order to improve understanding of other cultures. The CROSS-CULTURAL MEDIATOR has experienced both cultures and shares his/her insights with students and teachers who are making contact with the other culture for the first time. A LOCAL COMMUNITY MEETING focuses on sharing the experiences students encounter during their course. While it is always possible to set up a LOCAL COMMUNITY MEETING it might be difficult to find enough people able to take on the role of CROSS-CULTURAL MEDIATORS who have enough time to support all the different groups. However, a CROSS-CULTURAL MEDIATOR is likely to better explain the cultural differences. While the students in the different work groups may find that they have the same problems in cross-cultural communication and can share their ways of tackling the situation, a CROSS-CULTURAL MEDIATOR might point out better solutions and help to truly understand the situation.

In the solution, Nadine has chosen to set up an online community for communication. She does not use the learning management system of her own university because she knows that it is hard to enrol external students. That means she has to learn about new tools and she might choose the wrong tools. The benefits are that she can choose tools that best fit the task as GROUP HOME RE-LOCATION suggests, and also that she is not dictating her own university's toolset to all the partner universities. Instead she chooses an open platform and invites people to propose alternatives. Because she is the administrator for the online community she can easily add and invite new members without any formal application process. A potential drawback is that the administration of the tools costs extra time and since she did not rely on

her university's IT infrastructure she does not get any technical support from the IT staff. Also, she is not an expert in evaluating tools and the patterns provided in this section do not provide any guidance on how to systematically find a set of tools that can be used during the lifecycle of the course. Another concern is the move from one group home to another due to the emergence of new needs. To transfer the material from one place to another could be technically difficult, cause a lot of work or could even result in loss of previously stored information.

Yet the choice of the tools is very important in order to engage students and teachers in the online collaboration of the learning community. WATCH ACTIVE MEMBERS and GROUP LEADER EMERGENCE encourage group participants to self-organize and decide upon new steps. A lively discussion about the needs and next steps will increase student engagement. There are different ways to ensure GROUP LEADER EMERGENCE, i.e. the group leader can be selected implicitly or explicitly. There is no recommendation yet which way is better. There is also the danger that a group leader might be too dominant. Maybe an alternative solution would be to transfer the leadership role among the students. The facilitator can guide this process while he/she is WATCHING ACTIVE MEMBERS. A facilitator should encourage the students to take responsibility and continue to actively participate. However, this increases the workload for the facilitators and students could start to expect that there will always be guidance from the facilitator. The two patterns WATCH ACTIVE MEMBERS and GROUP LEADER EMERGENCE could either support each other or conflict with each other. For example, the feedback given by a facilitator who watches active members might encourage students to self-organize and find or select their own group leader. On the other hand, if too much guidance is provided and the students get used to it they might consider the facilitator as their leader and consider it as pointless to search for their own group leader. There is a sensible interplay of the two patterns that could be further elaborated in the future.

CONCLUSION

The patterns provided in this section emerged in different projects and some of them have been developed independently. This is very interesting because it seems that the same problems are addressed in different yet related ways. The major problem is that cultural differences are harder to understand if communication is limited to online tools. While such tools overcome long distances they provide less social context than face-to-face meetings. The solution derived from the patterns provides ways to share and discuss the cultural differences. It also finds ways to distribute the workload and turns the cultural specifics from being a hurdle into an interesting learning opportunity. Nadine learns about new cases of change management from other cultures. The students learn about coping with different behaviours and customs and how to self-organize and solve such challenges.

This fictive scenario has shown that the patterns can be combined with each other and how one pattern could support another pattern. It is a reasonable test of whether

the patterns fit together in general or whether there are contradictions between the patterns. This is already an interesting insight because if the patterns were to raise conflicts even in theory then their actual implementation would be problematic. This section has shown that the re-use and combination works in principle. However, a fictive scenario is just that, a thought experiment. In order to empirically test whether the patterns could actually be applied in other specific contexts, one has to use them in real world settings. It is open to the reader to run them in practice and report the success or failure.

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3. SOCIAL MEDIA AND LEARNER INTERACTION IN SOCIAL SPACES - OVERVIEW

INTRODUCTION

This section of the book elaborates a series of design patterns that explore the domain of social media and learner interaction in social spaces, with the aim of maximising the benefits that stem from deploying both these elements in collaborative educational settings. Social media is a broad term and for Kaplan and Haenlein (2010) can be defined as:

> a group of internet-based applications that build on the ideological and technological foundations of web 2.0, which allows the creation and exchange of user-generated content.

Within the design patterns that are illustrated here the term social media is used in an expansive manner. It incorporates the closely associated terminology and technologies that surround social software, as found in early descriptions by web 2.0 pioneers in blogs and other grey literature:

> [social] software supports, extends, or derives added value from, human social behaviour - message-boards, musical taste-sharing, photo-sharing, instant messaging, mailing lists, social networking. (Coates, 2005)

These are both descriptions that reflect the broad and pragmatic understanding of how social media and social software have become embedded within the day-to-day activities of many personal and professional elements of our lifestyle. Social media may be a relatively new term in our vocabulary but its roots and can be traced back to the major changes that have occurred in the internet over recent years. Here we have witnessed a profound shift in the nature of the web from a content driven, hierarchical delivery platform to one that has become a more open and dynamic application orientated platform. This shift had become synonymous with the term web 2.0, coined by Tim O'Reilly in 2005 who recognised a fundamental movement from top down controlled authorship to more democratic, distributed and user driven interactions. Indeed, O'Reilly (2005) encapsulated and distributed his understanding of the power of web 2.0 within eight distinct design patterns: The Long Tail, Data is the Next Intel Inside, Users Add Value, Network Effects by Default, Some Rights Reserved, The Perpetual Beta, Cooperate Don't Control, and Software Above the Level of a Single Device.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 151–158.

The impact of these changes are ongoing and extend not only to the informal affinity spaces that have come to dominate many of our personal online activities but also to the professional activities and expectancies within our education, media, political and business systems. Here we are mainly concerned with the ways in which learning and teaching, collaboration and knowledge sharing are changing and how we deal with the challenges and opportunities that social media and new social spaces present in the transition from content-centred to people-centred activity.

If we consider this new 'architecture of participation' as descriptive of the technical elements that underpin and support the use of social media then our concomitant social challenge has been to come to terms with what it means to be part of a 'culture of participation'. Jenkins et al. (2007) identified a number of forms of this participatory culture, highlighting the ways in which the line between consumers and producers has become increasingly blurred:

Table 1. Forms of participatory culture. Jenkins et al. (2006)

Affiliations	Memberships, formal and informal in online communities
Expressions	Producing new creative forms
Collaborative Problem-solving	Working together in teams, formal and informal to complete tasks and develop new knowledge
Circulation	Shaping the flow of media

He identified several challenges including the need to address gaps in participation, enhance transparency, and take time to consider the ethical dimensions of action. Using a design patterns approach is one of the ways in which we can begin to help educational designers work with social media, spaces and social software toolsets in education and find solution paths that address the issues raised above.

At their core, design patterns explore and elaborate the relationships between repeating forces in certain contexts and as such provide a potentially powerful way of identifying and capturing solutions in these areas. But the relative newness of social media in particular, presents us with one of the dilemmas in building a pattern language (or languages) in this domain since they are more often used to codify expertise in domains where a significant body of expert practice already exists.

Despite this caveat, it is the rapid and penetrating nature of social media that has resulted in common problem areas becoming visible. In response, measured solutions to these problems have emerged within ongoing practice. These kinds of responses are evident in two recent studies that have adopted a pattern language approach to examining practice within two discrete domains of social media use and activity in social spaces, first, in relation to developing and managing a digital identity (Rhizome project), and second in the successful utilisation of virtual worlds for learning and teaching (MUVEnation).

In the first of these projects, ten patterns were abstracted from a series of design narratives dealing with online presence and the management of digital identity. Each of the patterns highlights some specific attributes of social media and the interplay with social software use.

Table 2. Patterns developed in the Rhizome project.

Overlap between personal and private digital spaces	FACET ME - How we maintain differentiation between the facets of our online identity that we build for different audiences. DIGITAL IDENTITY PANIC - The steps you can take to reduce the confusion of maintaining multiple identities across multiple social networks.
Tracking and tracing activity	LEAVING TRAILS - To help other follow you in digital space, leave trails as you move communication and conversations from one channel to another.
Managing reputation	PURPOSEFUL DELAY - When working in a professional situation think twice before pressing the send button. Add a purposeful delay before sending potentially disruptive or emotionally charged messages. IDENTITY BEFORE COLLABORATION - People are reluctant to collaborate before they have established the identity of their peers.
Ethics and responsibility	PERMISSIONED AGGREGATION - This pattern addresses the ethical use of personal data such that the data subject's 'moral' rights are respected. WHAT'S MY NAME? - Resolving issues of taking on a pseudonymous identity for protecting reputation and mitigating negative repercussions. PUTTING CHILDREN FIRST - How can parents and guardians publish online images of their family life and manage the resulting contribution this makes to their children's digital presence?
Agency	IDENTITY PLACEMAKING - This pattern looks at the technical difficulty of developing a sense of agency when extending a digital profile across several applications/platforms. SPACE FOR LURKING - Providing the space and time for individuals to acclimatise to extant social rules and behaviours is an important design consideration for shared digital space.

In the second study, the MUVEnation project elaborated 28 design patterns in the use of 3D Multi-User Virtual Environments for learning and teaching (Warburton, 2009).

A number of the patterns that were formed during that project find their way into the collection presented here. It is worth noting that many of the patterns provide links into related pattern languages. For example, a number of the design solutions presented here are supported and extended by patterns that derive from other collections including Voelter and Fricke's (2000) set of 48 patterns on seminars. These patterns can also be read alongside collections that have parallel histories of development such as work from the pedagogical patterns project by Bergin et al. (2002) describing a range of patterns for experiential learning.

Both of these pattern languages highlight the richness of social media use and the ways in which social spaces force us to consider innovative solutions to contemporary reconfigurations of new, and not so new, educational challenges.

PATTERNS IN THIS SECTION

The nine patterns in this collection pull together a number of common educational themes that all revolve around the notion of 'participation' – arguably one of the key elements in any educational environment. The richness of the patterns in this section is such that they link the reader into a number of the related patterns and pattern languages that are described elsewhere in this book. Each of the design patterns within this section is supported by an illustrative design narrative. These provide the reader with contextual evidence and insights into how successful practice can be abstracted into a pattern language. The four design narratives described here are 'Developing and Evaluating a Design for an Online Forum' by Chatteur (3.1.1), 'Online teacher training in a web 2.0 setting' by Kern (3.1.2), 'Web 2.0 integration: disruptive or beneficial?' by Makri (3.1.3), and 'Facebook for design learners' by Lotz (3.1.4).

FRAMEWORK

A three-stage framework has been used to group the patterns in relation to building learner interactions in social spaces. Each pattern group leads the next in a process of designing the social educational setting through to managing and enabling productive and meaningful social interactions within it. The cross-cutting themes that are evident in this set of patterns include collaboration, enculturation, identity management and the development of self-awareness.

Design

This group of three patterns all work at the design level and describe problem solving approaches to building environments that are conducive to productive participation within a shared learning and teaching setting. In ONLINE FORUM FOR ELEARNING (3.2.1) Chatteur outlines the logical design structure and teaching practices involved in the creation of an asynchronous online learning forum for small class sizes of between

Table 3. Framework for the patterns in this section

PATTERN GROUP:	*THEME:*	*PATTERNS:*
1. Design	Designing the social environment or setting.	ONLINE FORUM FOR ELEARNING CAN YOU HEAR ME CHOOSING THE RIGHT BLEND
2. Scaffold	Scaffolding the process of moving isolated individuals towards productive social interaction within groups or communities.	WEAR YOUR SKILLS ON YOUR SHIRT SET GROUND RULES TOUCH POINTS
3. Communicate	Managing the channels for synchronous and asynchronous communication.	DO AS I DO NO TELLER WITHOUT LISTENERS CONTROL THE FLOW

5 and 30 participants. Warburton's pattern CAN YOU HEAR ME (3.2.2) highlights that understanding how virtual communication channels differ from real world settings is vital in making effective use of them – this is one of the major challenges of working within a 3D environment, in this case a MUVE (multi-user virtual world). Finally Makri and Kynigos in their pattern CHOOSING THE RIGHT BLEND (3.2.3) step back to consider designing educational settings that include social media toolsets and the choices that need to be made by providing ways forward to open negotiation in the use of these tools with their intended participants. Social platforms are diverse and provide a variety of functionalities that can often contradict already embedded technologies. The open and flattened nature of social software tools, for example they are often publically viewable, can clash with institutional systems that are centrally managed and closed.

Scaffold

In the second grouping we find three patterns that all prepare the ground for moving isolated individuals towards social interaction within a group or a community. In SET GROUND RULES (3.2.5) Pérez Garcia, Kern, Serrano and Warburton outline the foundation and baseline expectancies that need to be addressed in advance of running a synchronous text-based chat session where the aim is to drive participants towards production, participation and interaction. Linked to this we find Lotz and Mor presenting a pattern WEAR YOUR SKILLS ON YOUR SHIRT (3.2.4) that acknowledges collaboration as a key element in participatory environments. But being able to collaborate effectively is not a natural skill and this pattern cleverly provides one solution to help participants indicate their skill set. In the final pattern in this group, TOUCH POINTS (3.2.6) by Zamenopoulos, Lotz, Holden, and Ferreira, we find a pattern

that proposes a game-based format for helping students come to an understanding of how others perceive, react, or share their visions, actions and understanding. The thrust of any solution based upon this pattern being to develop social self-awareness within learners at a distance who will often be working alone and have differing cultural and educational backgrounds.

Communicate

In the final section on the theme of communication we have the design pattern of Lotz, Zamenopoulos, Holden, and Ferreira - NO TELLER WITHOUT LISTENERS (3.2.8). This is introduced first as it represents a link pattern between 'expectation' and 'communication' and links with the SET GROUND RULES (3.2.5) pattern. Importantly it highlights not only the importance of being an active listener but also the need to draw out less active users from lurking (Beaudoin, 2002) through to participation. Nonnecke and Preece (2000) found lurking was not reflective of a wholly passive style of behaviour, but rather, involved an active engagement with reading and applying strategies 'to determine what to read, delete or save'. In this pattern they use the analogy of a storyteller who needs listeners who legitimate the relevance of the story by giving attention, non-verbal feedback or small agreements. Similarly in an online discussion, students that 'listen' need to legitimate the value of contributions to the community or group through some form of feedback (agreement, examples, or some form of contextualisation of the content). In this frame, positive feedback gives the poster authority in the group and confidence to continue posting. In CONTROL THE FLOW (3.2.9) Pérez Garcia, Kern, Serrano, and Warburton go on to address the mechanics of synchronous text-based chat, focussing on understanding the technical affordances of the system you are working with, including the structure, moderation rules and how to manage interruptions. The aim being to set and control the environment, as far as is possible, to focus on the planned teaching and learning activities. What is clear from this pattern is that although it draws on experiences from within a social virtual world (Second Life) the solutions are transferable to many different types of synchronous chat scenario, such as a text based conferencing tool. In the final pattern DO AS I DO (3.2.7), Holden, Lotz, Zamenopoulos, and Ferreira describe how students can learn how to relate to one another and though the example or the moderator or facilitator are encultured into an online community and learning environment.

CONCLUSION

The design patterns within this collection provide abstracted examples of successful practice within the broad domain of social media and learner interaction in social spaces. They provide design solutions for designing, building and running educational activities that utilise a potentially large range of social media tools. They not only identify specific problem-solution areas but also act as a jumping off

points to discover related patterns in related pattern languages. The solutions, though founded in particular socio-technological settings, such as MUVEs, online forums and social networking sites are at their heart transferable and address important themes that attend to the possibilities that they broadly suggest in enhancing collaboration, knowledge sharing, and identity development. In this manner they build upon the features of social media and social spaces identified by Boyd (2003) in Darwin magazine in which the nature of sociability and computing are discussed. Three defining characteristics of social software are suggested:

– Support for conversational interaction between individuals or groups ranging from real-time instant messaging to asynchronous collaborative teamwork spaces.
– Support for social feedback which allows a group to rate the contributions of others, perhaps implicitly, leading to the creation of digital reputation.
– Support for social networks to explicitly create and manage a digital expression of people's personal relationships, and to help them build new relationships. (Boyd, 2003)

These characteristics can be extended to include the community gains that are evident where many users benefit from other users acting in sociable and community-oriented ways. The solutions that can be designed through applying these patterns are applicable to a variety of problems. The design scenario at the end of this section, 'Visual Portfolios for Cooperation in Virtual Worlds' (3.3.1) provides one such example. One of the patterns in this section is applied to the process of designing a virtual space for facilitating effective collaborative activity where, as noted by Warburton and Pérez Garcia (2009) reporting on the OpenHabitat project, collaborative activity is not always straightforward or natural to those participating:

> Collaborative building requires knowledge of and communication with others, and this was identified as a skill that went beyond the virtual world setting. (Warburton & Pérez Garcia, 2009)

Finally, returning to Jenkins et al. (2006), we can see that these patterns provide practical steps towards addressing a number of the issues surrounding teaching new skills that were identified under the themes of play, performance, simulation, appropriation, multitasking, distributed cognition, collective intelligence, judgment, transmedia navigation, networking, and negotiation.

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3.1.1 DESIGN NARRATIVE: DEVELOPING AND EVALUATING A DESIGN FOR AN ONLINE FORUM

SUMMARY

Addressing the need to investigate how to embed learning theories into the interface, information architecture and content design of e-learning courseware, this research creates a method to develop 'design for pedagogy patterns', a language of design which helps designers place teaching and learning theories at the heart of e-learning design. It does this by developing a pattern-making tool – the 'pattern pack' – which aids writers in the task of creating a design for a pedagogy pattern. This paper presents a design narrative about the application of the pattern pack to develop a 'design for a pedagogy pattern' for an e-learning online forum. An evaluation of the patterns by an expert is included to discuss the quality of the patterns that can be created using this methodology. This work formed part of the work of the 'Design for Pedagogy Patterns for E-Learning' project.

SITUATION

The research and resulting pattern was part of a PhD study project undertaken at the Faculty of Architecture, Design and Planning at the University of Sydney in Australia. The research set out to create a methodology for embedding the principles of teaching and learning (pedagogy) into the design of e-learning courseware. Design in this instance is a broad term, taking into account not only interface design, but also information architecture and content design.

Creating e-learning courseware to make best use of learning theories can add complexity to an already complex design task. Current approaches to e-learning design lack a guiding principle for embedding pedagogical theory into courseware. Designers, content specialists and teachers may be expert in their various fields, but find themselves cognitively burdened when faced with the task of creating e-learning courseware. Mapping classroom learning into the online domain is a complex task (Vrasidas, 2004).

Design pattern languages can facilitate this task. Design patterns create core modules that are composed of smaller elements, but which are linked in an integrated way (Derntl & Motsching-Pitrik, 2004). To date design patterns for computer-mediated interaction, website design and software development have been created, but none have taken into consideration issues to do with pedagogy (Schümmer & Lukosch, 2007; Van Duyne et al., 2003). This research uses two pedagogical theories,

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 159–169.

constructivism and experiential learning, as an overall design philosophy (Goodyear, 2005) and embeds these theories into 'design for pedagogy patterns' for e-learning. The 'design for pedagogy patterns' cater not only for the designers of e-learning courseware, but also for the tutors or academics that use the resulting courseware.

The research piloted a methodology for the embedding of pedagogy into design patterns and subsequently developed a tool which was designed to facilitate the pattern writing process. The design pattern writing task is for an e-learning forum, the end users of this pattern are the e-learning courseware designers and the tutors/ academics who use the resulting forum. The reason that the pattern must cater for both groups is that the courseware design must map onto the teaching practices that it supports. It describes the baseline structure of online communication for the forum.

The tools required in the writing of this forum pattern are the 'pattern pack', a computer and access to the internet. The evaluation of the patterns by the expert was an assessment tool in the form of an online survey.

TASK

The task is broader than simply writing a design pattern for an online forum. In the process of creating 'design for pedagogy patterns' for e-learning, this research:

- Develops a methodology which embeds pedagogical theories into design patterns.
- Creates a tool to formalize the methodology (see Actions).
- tests this methodology through the writing task using eight participants, and
- Evaluates the resulting patterns to determine the best 'design for pedagogy pattern' (see Results).

The problem was that if the Alexandrian pattern structure was used (Alexander et al., 1977) a pattern either became a design pattern OR a pedagogy pattern. The structure was unable to cater for both. 'Design for pedagogy patterns' adapts the original Alexandrian pattern language structure to add a pedagogical layer. In order for a design pattern to become a 'design for pedagogy pattern' there are certain criteria that a 'design for pedagogy pattern' must fulfil.

A design for pedagogy pattern must:

- Show the relationships between pedagogic strategies associated with the design elements and those linked with the general and abstract ways of thinking about education, including the social and the educational context, teaching practices and the tactics for engaging students.
- Make the pedagogy explicit, in how it is articulated through image, text and interaction.
- Refocus the emphasis of e-learning design onto pedagogy and link teaching practices with the resultant courseware.

This research uses the basic theoretical approach that people learn from their experience, using the principles of experiential learning theory (Kolb, 1984). A

'trying out' or experience-based approach is at the core of experiential learning theory, and, if encapsulated in a collaborative learning space, provides the real-world context outlined in social constructivist theory. The 'what-if' ability available in e-learning is a key attraction, and, according to both experiential and constructivist learning theories, affords additional opportunities in the consolidation of knowledge.

However, the methodology of creating a 'design for pedagogy pattern' is not limited to the two learning theories mentioned. The structure of a 'design for pedagogy pattern' enables the use of alternate and multiple teaching theories as a guiding pedagogical philosophy (Goodyear, 2005).

In creating a 'design for pedagogy pattern' for an e-learning forum, writers need knowledge of the pedagogical philosophies, current research exhibiting best practice and examples of current forums from which to extract the generic design and pedagogical elements. To facilitate this task, a methodology was developed to formalize a process for writing a 'design for pedagogy pattern':

– Text search for pattern problem, by the writer.
– Define the problem, based on the text search of existing literature and e-learning courseware.
– Search for solution and teaching strategies and optional case studies, which fit constructivist and experiential learning theories (or other pedagogical theories).
– Write solution and teaching strategies in terms of the pedagogical philosophies. (Chatteur, Carvalho & Dong, 2008).

The aim was to refine the method for producing 'design for pedagogy patterns', not just to develop a pattern per se. This methodology was trialled in the early pilot studies with three pattern writers, with a basic set of documents: primers on constructivism and experiential learning theories, and pattern template documents. After each pilot these documents, which subsequently formed part of the 'pattern pack', were evaluated and updated, based on qualitative feedback.

When the methodology was put into practice, it became apparent that writing a 'design for pedagogy pattern' was a complex task in itself. The problem became how to make it easy to identify and extract design solutions and associated teaching strategies based on constructivism and experiential learning from the existing forums and the readings. Two of the pilot pattern writers completed the writing task, but expressed frustration at the complexity of the task, the third failed, after spending many hours trying to decipher the task.

ACTIONS

1) Developing the 'Pattern Pack'

The task of associating and embedding the pedagogical theories with the design needed to be made simpler and clearer. A methodology based on an experiential

learning approach was developed. Using all four elements of the experiential learning cycle (Kolb, 1984, p. 42), the writers would be asked to transform their concrete experience of the online forums and peer-reviewed readings through reflective practice using the 'pattern pack' to form theories (abstract conceptualization) about the generic structures linking pedagogy with design in e-learning forums. This would then be put to use in writing the design for pedagogy pattern (active experimentation) (Chatteur & Dong, 2008).

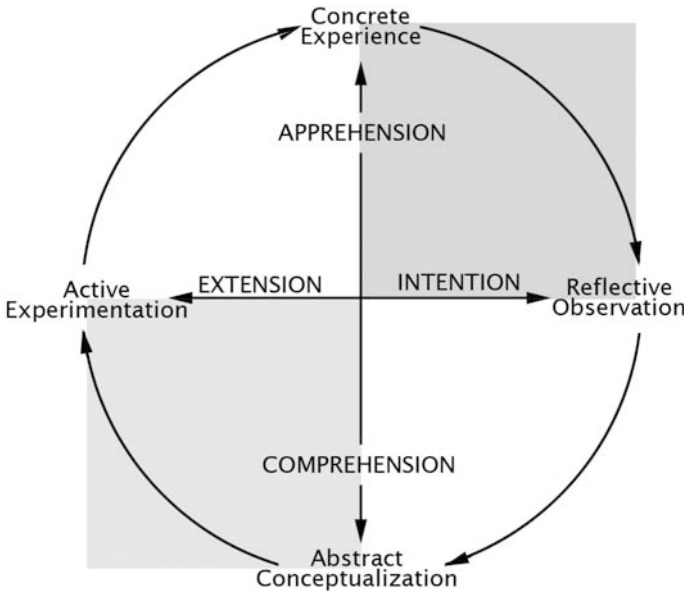

Figure 1. The Experiential Learning Cycle (after Kolb, 1984, p.42).

The first major action in this research was the development of this tool, the 'pattern pack'. The 'pattern pack' contains instructions, background readings, pattern templates and two sets of cards. One set of cards (white) identifies the generic design elements seen in an e-learning forum such as menu navigation, forum registration page, and threaded discussion pages. Each design element was analysed using the Function-Behaviour-Structure (FBS) framework (Gero, 2002) as an ontology to describe a design work with the focus being on the structural elements of the design. The second set of cards (blue) identifies pedagogical practices based on experiential learning and constructivism such as abstract conceptualization, active experimentation, and reflection. In this case the pedagogy cards displayed the function of the FBS analysis, as the structure (i.e. how the pedagogy is realised on screen) is variable (Chatteur & Dong, 2008).

The research subjects (the writers) use the 'pattern pack' to help them write a 'design for pedagogy pattern' for the online forum. The process is outlined in Figure 2.

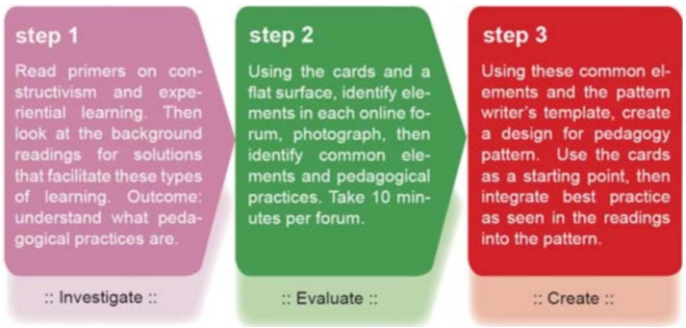

Figure 2. The 'pattern pack' process.

The writers firstly read primers on constructivism and experiential learning, so as to gain an understanding of the learning theories. A summary of current research on online forums is provided as background reading, outlining best practice. Online e-learning forums are examined and a hierarchy is created using the cards, like a flowchart. The cards enable the organization of the visible design elements (white cards) and allow the writers to link these elements with the supporting pedagogy (blue cards). The hierarchy is photographed for each of the three forum examples and recurring design and pedagogical elements are identified. Using the recurring design and pedagogical elements, the writer creates an 'ideal forum' hierarchy (See Figure 3). The writers, using an empty pattern template, wrote the pattern with guidance from both the brochure and a document explaining writing style and identifying the possible content for each section. The aim was to give the writers a consistent structure.

Figure 3. The card hierarchy for the forum pattern.

The ‘pattern pack’ used by all of the writers contains the same pattern problem:

Students need to communicate with each other about the course (subject). How does one design a forum to facilitate and encourage collaborative learning?

By pre-defining the pattern problem and embedding within it pedagogical issues pertaining to social constructivism, it was hoped that the resulting patterns would be consistently on-topic.

2) Writing with the ‘Pattern Pack’

The ‘pattern pack’ was used with eight writers in the creation of a ‘design for pedagogy pattern’ for an e-learning forum. The eight writers were individuals who fulfilled the following selection criteria:

– They were either designers or design educators.
– They were in possession of (or in the process of getting) a design qualification at post-graduate level.
– They were familiar with e-learning and internet technologies.
– They were able to write at an advanced level in the English language.
– The test subjects were given four hours to complete the writing task, in two separate sessions of two hours each. This was done on the advice of one of the pilot subjects who was also a cognitive psychologist, who suggested that dividing the task into two sessions would reduce cognitive load. The background readings were given to the subjects in advance.

Session one was the card task, identifying the common design and pedagogical practices for online forums in the form of a hierarchy. These card hierarchies were photographed.

Session two was the writing task, where the card hierarchies were used to aid the writing of the ‘design for pedagogy pattern’.

Feedback from the writers indicated in the majority of the cases that the task was clear, and although difficult, not prohibitively so. Most of the writers requested more time for the writing task; however the card task was completed within the two hour time frame.

3) Developing the Evaluation Tool

In this section the variables used in evaluation will be examined. In the Tasks section (above) the criteria for successful ‘design for pedagogy patterns’ were outlined.

The first criterion is to determine a relationship between pedagogic strategies associated with design elements linked with general and abstract ways of thinking about education, including the social and the educational context, teaching practices and the tactics for engaging students (See Table 1).

Table 1: Examples of pedagogical strategies and general questions on ways of thinking about education.

This pattern outlines how to help students reflect on their learning.
This pattern is likely to result in e-learning courseware that will stimulate a student's learning experience.
The concepts in this pattern clearly link theory and research with practice.
Constructivist learning theory is incorporated into the writing of this pattern.

The second criterion is to make the pedagogy explicit, through image, text and interaction (See Table 2).

Table 2: Examples of explicit use of pedagogy through image, text and interaction.

This pattern shows how informal communication (such as instant messaging and email) could be used.
Social interaction could be promoted by using this pattern.

The third criterion for a successful 'design for pedagogy pattern' is to link teaching practices with the resultant courseware, while refocusing e-learning design onto pedagogy (See Table 3).

Table 3: Examples of the linkages between design and teaching practices.

I could identify links between the design solution and the teaching strategies.
This pattern contains all of the common elements required for a pattern that links design with pedagogy
This pattern promotes the use of student/teacher communication.

If these criteria were to be true of all 'design for pedagogy patterns' then logically part of the evaluation tool would contain generalized questions. However, in order to rank the patterns, it was also necessary to determine how these criteria address this particular pattern, the e-learning forum. Some pedagogical and design issues are particular to the type of pattern being developed. It was therefore decided to divide the evaluation into two sections: those that could deal with 'design for pedagogy patterns' in general, and those questions that evaluate the forum pattern in particular. In this way part of the evaluation tool could be reused for future patterns, whilst maintaining the granularity required for this particular pattern. The evaluation tool contained nineteen questions that could be applied to 'design for pedagogy patterns' in general, and six questions specific to the forum pattern.

A Likert scale questionnaire was developed as an online tool for the experts to use to evaluate the patterns. This questionnaire also captured information on the experts and the identity of the pattern being evaluated. It also recorded an overall ranking of the pattern, on a scale of one to eight (where one is the best pattern). This ranking could be triangulated with the Likert scale, in order to validate the results. The expert evaluation also asked 'How would you rank the overall quality of this pattern on a scale of 1 to 5? (Where 5 is excellent)'. This was to gain a perspective of how the study's 'design for pedagogy patterns' compared with design patterns in general.

RESULTS

The study resulted in eight individual 'design for pedagogy patterns', of varying quality. Seven out of the eight patterns addressed the pattern problem statement and discussed the design of an online e-learning forum. Overall there was a consistency in the pattern structure, although not of content. The quality of the study's patterns appears to follow a bell curve, however, none fell into the 'excellent' category.

After the evaluation by an expert in design patterns, the best 'design for pedagogy pattern' was determined. Pattern G scored 79/95 in the questions about patterns in general and 25/30 in the forum specific questions – an average score of 83%. It was ranked first in the scale of 1-8 (where 1 is the best pattern and 8 is not), and ranked 4 out of 5 in the overall quality question.

Future work for this study will further evaluate the patterns with another design and pattern expert to ensure accuracy of this result.

This pattern succeeded where others did not, in clearly addressing the teaching and learning practices that can be applied to an online forum. The links between design and pedagogy are clearly made, as are the pedagogical reasons behind the design choice. In the teaching strategies section it is clear what teaching practices can be put to use in this forum.

In comparison with the other 'design for pedagogy patterns' this particular pattern ranks well – but how does it compare with a generic forum design pattern? In their book *Patterns for Computer-Mediated Interaction*, Schümmer and Lukosch (2007) outline a pattern for an online forum. In order to judge the overall quality of the 'design for pedagogy pattern' a comparison can be seen in Table 4.

From the table above it is clear that the 'design for pedagogy pattern' addresses the solution statement in much more detail, as well as the teaching methods that accompany the pattern. The Schümmer and Lukosch pattern is accompanied by a case study of an expert in collaborative learning but it does not address issues to do with pedagogy and/or user involvement. The 'design for pedagogy pattern' details the design solutions for the online forum in much more detail than the Schümmer and Lukosch pattern.

Table 4: Analysis of Forum vs. Design for Pedagogy Forum Pattern G

Schümmer and Lukosch	Design for Pedagogy Pattern G
	Summary
Picture of forum in Rome, Italy	(none)
Background	Context
Definition of forum	Enhancing student learning
Use as asynchronous communication	Intended use as logical structure in the context of a class of 5- 30 participants Assumes use of tutor/moderator Use as asynchronous communication
Problem statement	Problem statement
Problem background Use cases (when pattern should be used)	
	Forces (added for this book).
	Process Diagram
Solution Statement	Solution Statement
Forums list Use analysis Danger spots Email clients/mailing lists Threaded discussions	Use analysis (announcements and messages) Forums list/threaded discussion/multiple threads/ multiple messages Public/Private message modes Design elements for public/private modes (very detailed) Admin pages Volume analysis (how many pages at each level)
Image of online forum	Structure diagram
n/a	Teaching strategies Strategies for success Calm and friendly atmosphere Don't dominate discussions Social interaction Critical thinking Peer feedback Ensure each message has a reply Exploration Deep enquiry Positive feedback Clear discussion objectives Learner activity goals

(*Continued*)

Table 4: Analysis of Forum vs. Design for Pedagogy Forum Pattern G - Continued

	Reflection/reflective observation Scaffolding Alternate pedagogical solutions
Related patterns Feedback loop Interaction directory FAQ Quality inspection Threaded discussions Periodic report Change indicator Chat Message board E-Forum	Related patterns Moderation settings Private messages Social space
Case Study (about an expert in computer-supported collaborative learning)	Case Study (present in structure but no content)
References (yes)	References (present in structure but no content)

LESSONS LEARNED

By providing a tool that allows writers to clearly identify:

– the design elements of an e-learning forum
– the pedagogical practices used, and
– the linkages between them the process of linking design with pedagogy was made more straightforward for the writers.

By using:

– examples of best practices in the background readings
– current online forums for e-learning the writers were able to address the gap between best and current practices in online forums.

The pattern template when used in conjunction with the cards and card glossary resulted in a generally consistent structure with clearly identified design elements. However, it must be noted that the patterns that have been ranked higher by the expert evaluation were those that were written by people who had experience in design specification documents, use cases and online forums, as well as having a post-graduate design qualification.

The evidence is unclear as whether the 'pattern pack' is a panacea, but when used by a trained person, it does result in patterns that appear to address the issues of online learning and teaching better than the 'base line' pattern.

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3.1.2 DESIGN NARRATIVE: ONLINE TEACHER TRAINING IN A WEB 2.0 SETTING

SUMMARY

Showing language teacher trainees the possibilities of using technology in language education in two online sessions.

SITUATION

Planning and providing two 90-minute online sessions for language teacher trainees on 'Technology in Language Education'. There were ten participants and their full-time face-to-face tutor. Most trainees were computer-literate but had little experience with web 2.0 tools and most of this was for private purposes. Some of the trainees had no teaching experience yet, while the others were experienced teachers training for the diploma. Trainees were from different countries but except for one, who was still in her original country, they were all at the school where their training centre was located.

TASK

Planning and conducting two 90-minute sessions for trainee teachers to give them an overview of what web 2.0 tools are and show them examples on how these can be used in language education.

ACTIONS

I chose to do the first session in a 2D conference facility. I decided to use WiziQ because it doesn't require any downloads, is easy to use, has a good text tool and the chat window is always visible. The session was an interactive presentation.

WiziQ offers a lot of possibilities to control chat and other kinds of interaction (who can use voice and the tools on the whiteboard, whether participants are allowed to send each other private messages, etc.)

I tend to give all participants writing rights and the right to back-channel. Some of these controls can be selected for the whole group and some individually. The problem with the latter choice is that when participants have to log off for some reason and then come back, I have to assign the controls again each time. If I have

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 171–175.

a lot of participants, this can be quite cumbersome and I might have to scroll to find that person and click on the control buttons next to their names.

The participants did not have any previous experience with such virtual conference rooms, so I wanted to make participation as easy as possible and did not impose too many rules of conduct. The only rule that I introduced was that they could write in chat at any time during the session and that I would keep an eye on it and react to what they were saying at some point.

I like to allow participants to back-channel and to participate in chat at any time but ask a colleague or a participant to help me moderate and scan the chat window for questions and comments so that I don't miss anything relevant. This has worked fine for me in online presentations and training sessions in 2D facilities like WiziQ and also in this session. In this session, their full-time onsite trainer assisted me.

As in most sessions when I am the session leader or presenter, I used voice most of the time and participants could use text chat and were given audio control if they wanted to say something or if I called on them.

I think a lot of how one deals with chat and controlling of it has to do with one's comfort with the tool used, or with being challenged by the participants and being able to tolerate back-channelling to some degree. It has also to do with how a trainer sees his/her role (e.g. lecturer or facilitator) and how he/she processes information. I prefer having a conversation rather than lecturing.

When participants are particularly active in chat, I pause sometimes and say that I will scroll back and read the chat for a moment and will then read out loud what has been said or asked, and either comment on it or ask for the participants' reactions, which I also did in this session.

Sometimes, I give the person who made a comment or asked a question the floor to either clarify what they have said or give us some more detail. I find this a much better solution than asking participants to keep their questions and comments till the end, which would mean they would either try to remember them or note them down somewhere. In my experience, as a participant and trainer/presenter asking participants to hold back with their questions and comments until the end results in fewer questions or comments which is a lost learning opportunity for everybody. They can still be dealt with at the end instead of during the session if that is more appropriate.

With the same group, I went to Second Life the following week. Their trainer had helped them sign up and practise some of the basics a couple of days before. I gave a short slide presentation and showed them a classroom scenario that I had set up and we elicited activities that could be done in this setting. Then, we went on a short field trip where they had to do language learning activities and finally, to a sandbox where they could try out the building tools and play with some of my physical cubes.

While still in the sandbox, I gave them some discussion questions which I displayed on a notecard reader. The chat became very lively and scrolled forward

fast so that I was afraid I would miss some questions or comments. I stopped using voice for two reasons. Firstly, to be able to concentrate on what was being written, and to reply and also to give the participants the chance to concentrate. Secondly, to have a record of the chat so that participants would not have to worry about taking notes.

My WiziQ session was private so only those who were invited or were given the link could participate. There was no chance of an uninvited guest disturbing the session by spamming chat and interrupting the flow of the conversation. In Second Life, my session was in public space and although I selected places that are not normally crowded, I was prepared for passers-by to show up and it did happen. I greeted the avatar and briefly explained that we were in a training session. At the same time, I used the opportunity to tell the trainees that this is what can happen when they hold sessions in public places. I added that as long as the guest is not a mean kind of griefer (I had nice once, too), it can actually enrich the class and can be taken advantage of, especially in a language class where meeting such guests is actually an opportunity to practise spontaneous conversations about unplanned topics, in highly authentic way.

In case of griefers, who for example spam the chat, I first ask them politely not to do that, and if it doesn't help then I tell participants to mute them and do that myself. If it's on land that I can control, I can ban them but this has never been necessary so far. Sometimes, I also ask participants to go to group chat/instant messaging (IM) instead of local chat, though this means they have to have another window or tab open.

Another problem that I sometimes had to deal with in Second Life is that some participants like to use special gestures that display large multi-line graphics in local chat made with ASCII code. These are used for greeting others, expressing their feelings, etc. Although, they can add to a session in a positive way, they can disrupt the flow in chat and make it difficult to follow a conversation. If it becomes too much, I sometimes tell participants not to use them during the session.

Too much chatting about unrelated things (small talk) hasn't been a problem in any of my formal sessions. I believe the reason for this is that I plan a lot of interactivity into the tasks. As an example, in the teacher training session, I had several slides with only a title or a question and I asked the participants to collaboratively come up with the answers either by writing in the empty spaces of the slides or in chat. Sometimes, they had to reorganize what had been written or do other tasks which kept them on their toes. In synchronous sessions at a distance, long stretches of passive listening to a presenter should be avoided.

RESULTS

– Both sessions went well and I have received very positive feedback. Trainees were very interested, participated actively with questions and comments and expressed their interest in trying out some of the tools.

- My prior experience in teaching languages classes and doing teacher training in Second Life helped me to plan the sessions and to make adjustments to the session where necessary.
- Having an assistant helped me to deal with chat when it became very lively.
- Making the sessions interactive instead of lecturing made the sessions more memorable and interesting to the participants.
- Taking students to Second Life was risky as they were total newbies and we only had 90 minutes. But I decided it is worth the risk because I believe that someone who has no experience with 3D virtual worlds cannot grasp their potential without experiencing it themselves with their own avatars. Gladly, the participants' full-time trainer was a new but keen Second Life user and prepared to take this risk. However, to be on the safe side, I had a plan B. I had uploaded my presentation slides to WiziQ and scheduled a session, so that we could have moved there in case Second Life was down.
- In the WiziQ session I could not go through all the slides because we started late as it took a while until everybody was present and also because I asked participants to participate in the presentation and collaboratively brainstorm and write their contributions, which they did and which was good.
- I was worried that I had packed too much into the Second Life sessions, especially because they were total newbies. However, it was necessary and I did want them to experience different possibilities of teaching in a 3D virtual world. I was there half an hour before the session to help everybody with any issues and rushed a bit through the first presentation part but gave them the overview slide (mindmap) for later review. Unfortunately, there was not enough time for a longer discussion (only 15 min) which was a pity because they were very engaged in it. The trainer promised, however, they would discuss the questions in a face-to-face session later.

LESSONS LEARNED

- Don't over-plan, rather plan in some flexibility (e.g. slides or activities that can be skipped or added if necessary) and leave enough time for discussion and feedback which is essential for processing what was seen.
- Select virtual classrooms that don't need any downloads and are intuitive to use.
- Don't underestimate the additional time needed to get everybody set up before an online session.
- Don't overwhelm participants who have no prior experience of a tool with too many rules.
- Make online sessions interactive and collaborative to keep participants on their toes and avoid boredom which might result in too much small talk in the chat window.
- Make sure participants receive instructions and tips for a tool to be used in advance and have the chance to test it before the actual session.

– Don't control chat too much, and allow questions or comments to flow freely throughout the session whenever possible to maximize valuable participant contributions.
– Have an assistant who helps moderate the chat.
– Pause the presentation or session at times to give participants the chance to catch up with the chat and reply to questions and comments. It's frustrating when chat is lively and some are slow readers or typists. It's equally frustrating and demotivating if someone's contributions are missed and nobody reacts to them.
– Be prepared to give students handouts, or the slides, so that they have time to contribute more in chat instead of taking notes.
– Ask participants to mute spammers and be prepared to ban them if necessary and if you have the rights.
– Ask participants to refrain from using chat gestures (e.g. ASCII code) that fill the chat area and make it difficult to follow the conversation.
– Move to group chat if local chat is being spammed by other avatars.

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3.1.3 DESIGN NARRATIVE: WEB 2.0 INTEGRATION - DISRUPTIVE OR BENEFICIAL?

SUMMARY

This design narrative describes an intervention that took place in a higher education setting, during a pedagogy focused MA course, addressed to 14 graduate teachers of various specialties at the Educational Technology Lab, University of Athens, Greece. Following the blended learning rationale of the course, we decided to enrich its flow of activities by introducing a web 2.0 element in order a) to overcome some practical difficulties posed by the previous use of the institutional LMS, b) to allow for a greater degree of interactivity, and c) to allow for the possibility of sustaining a community of professionals after the end of the course. To achieve these goals, we implemented substantial changes to the course's previous curricular and structural character. With regards to interactivity, we observed a greater degree of student involvement. With regards to the practical issue of students discussing artefacts while actually seeing them, we had no successful result, due to our misjudgement of time allocation. Finally, with regards to the possibility of transforming the formal learning community into an informal one, we realized that this is possible, but we are sceptical on its sustainability, therefore, we are on the process of inventing appropriate supportive measures to be taken in the future.

SITUATION

The setting for this design narrative is a pedagogy focused MA course hosted at the University of Athens Educational Technology Lab (http://etl.ppp.uoa.gr/) aimed at a group of 14 graduate secondary and primary education teachers who possessed adequate pedagogical expertise, but demonstrated varying ICT competency levels. Some of the students were already qualified teacher educators but others, even though acquainted with common desktop applications, found this course was their first experience in using ICT for pedagogical purposes. Their ages ranged from 23-25 year old new graduates from Schools of Education to mature students and experienced teachers over 40 years old.

The 'Introduction to new technologies in education' course lasted approximately six months, and comprised 12 two-hour weekly meetings with one day dedicated to oral presentations and the evaluation of student work. Over the past three years the teaching approach has shifted from traditional face-to-face instruction to a

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 177–181.

blended learning approach that combines previously used activities with the use of an institutional LMS based on the Claroline open source platform.

The course included two modules:

– Theoretical principles. Introduction to educational technology: What makes software 'educational'? Categories of activities performed through the use of educational software.
– Practical work. Co-construction of pedagogical materials: artefacts and accompanying activity plans for the teacher and students.

TASKS

Our previous experience with the use of the LMS had found two problems:

– Students tend to loosely interact online throughout the duration of the course, and abruptly cease online communication once their official coursework duties are fulfilled.

The restriction posed by the LMS for separate 'spaces' for posting artefacts and for discussing them. Students were assigned to collaboratively construct pieces of software and afterwards discuss with their peers accompanying activity plans that they were progressively developing. As the LMS doesn't allow students to directly post their executable files on the platform forum, they had to move between two different 'spaces' to see each others' work and comment on it ('Drop box' and 'Forum'). This was rather tedious and discouraging for most.

We decided to tackle these issues through introducing the students to a range of web 2.0 tools. This, we thought, would:

– induce more active involvement during the course
– allow students to comment on digital objects while actually seeing them, and
– allow for the possibility of sustainability of a professional community, after the end of the course.

However, an organizational restriction we had to address was that the use of web 2.0 tools should complement, and not hinder or replace, the use of the LMS platform, as there should be an official record of students' progress and work.

ACTIONS

To meet the above goals, we had to disrupt the regular flow of activities of the course by making the structural and curricular changes below:

– Introduction of a new module titled 'Web 2.0 applications and their pedagogical use'.
– Theoretical grounding of social software use, through studying and discussing Siemens' (2004) article: 'Connectivism: a new theory for the digital age'.

– Active use of a range of simple, but representative tools: de.li.ci.ous, SlideShare and Flickr. The students should open individual accounts and report on their views of the tools' pedagogical potential in his/her own subject.
– Active use of blogging platforms (Blogger and Wordpress). The students should create their own blogs, connect them through a blogroll and report on their views on how they intended to use them (personal expression, professional portfolio, pedagogical tools).

RESULTS

Our goals were mostly fulfilled. We could therefore call this experience relatively successful. However, there certain difficulties appeared in attempting to implement the designed changes in the course. Some are experiential observations, and others were reported to us by the students themselves in their response to the course evaluation questionnaire and during our discussions with them.

In particular, with regards to the actions performed to fulfil our goals, the results were as follows:

Action	*Result*
Introduction of web 2.0 module	Mostly successful. The students, though unacquainted with this type of ICT use, expressed a vivid interest in learning more about its use and rationale. Some of them invented creative ways of using web 2.0 tools as pedagogical tools in their subjects.
Theoretical grounding of social software use	Successful. The students engaged in lively discussion and idea exchange, both in face-to-face and in online settings.
Active use of range of simple web 2.0 tools	Successful. The students formed small networks, exchanging links, tags, photos and presentations; they also made informative presentations on the tools' pedagogical potential and pitfalls.
Active use of blogs	Not successful. As blogs were introduced towards the end of the course, the students didn't have enough time and energy to embrace blogging as a new practice, as, at that time, they were focused on preparing their final assignments. Most of their blog entries remained unanswered, and their blogs 'uninhabited'. Some students said to us that they would have preferred to have been introduced to blogging at the beginning of the course and to have carried out all coursework (discussions etc.) through their blogs, and not through the forum provided by the LMS platform.

With regards to the aims we had initially set, the results brought about were as follows:

Aims	*Result*
More active involvement during the course	There was definitely more communicative load, especially with regards to the new tools. Students took advantage both of our (teacher and facilitator) help, and of peer support. There was also a large amount of comment on George Siemens' article. However, as there was freedom on the choice of the tool they would use for their final assignment, three students selected the simplest tools (SlideShare and del.icio.us) as the centre of their activity plans, avoiding the effort to make connections and combinations among a range of tools, and also avoiding the use of blogs.
Allow students to comment on digital objects while actually seeing them	The students engaged with collaborative activities (co-construction of artefacts and activity plans), but were unable to properly comment on their constructs on their blogs, as the latter were introduced at a late point in the course. So, limited affordance of the LMS for this activity remained a restriction.
Allow for the possibility of sustainability of a professional community, after the end of the course	The students created a group blog where they negotiated issues that were important to them, but had not been properly addressed throughout the course, due to lack of time (for example, the issue of educational use of Second Life, or the impressive immersion of adolescents in role playing games). One of them took up the role of administrator, gave authoring rights to all members of the group, and posed the question of how the blog ergonomics would be decided upon, so as to depict the group interests. This decision was collaboratively made.

LESSONS LEARNT

What this experience taught us can be summarized in the following points:

– When setting 'ambitious' goals, timing is paramount in achieving them. In our case, the goal of 'allowing students to discuss their constructions while seeing them' should be a priority. This, in turn, would have affected the flow of activities, and introduction to blogging should precede both the theoretical discussion on social software, and the introduction to a range of web 2.0 tools.
– As there are many web 2.0 tools, they require varying levels of technical competency. If students are given freedom with regards to the choice of one or a

combination of them, some may select to use just one, resulting in a superficial activity plan. There should be, therefore, a concise set of instructions, to guide work for the final assignment.

– Appropriation of web 2.0 tools may prove to be time-consuming, especially with students with little or no experience in their use. This observation has made us reflect a) on the content of the course, that is, if it is possible for a course on pedagogical use of web 2.0 to contain other modules as well, and b) on the range of tools the students are to be acquainted with. At times, it might be better to keep it simple, as shown in the pattern KEEP IT SIMPLE (Finley, 2009).
– Professional communities may indeed be a result of a course including web 2.0 applications. We consider it necessary, though, in order for the community to remain active, to provide appropriate stimuli to the graduates, such as organize certain events, such as an 'Info day', or periodic seminars, to keep in touch.

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3.1.4 DESIGN NARRATIVE: FACEBOOK FOR DESIGN LEARNERS

SUMMARY

Using Facebook to create an online community of distance students learning design. This work was done as part of the project *AtelierD: Achieving Transformation, Enhanced Learning and Innovation through Educational Resources in Design* (http://design.open.ac.uk/the_department/AtelierD.htm), and was carried out in conjunction with Theodore Zamenopoulos, Georgy Holden, and Giselle Ferreira.

SITUATION

The setting of this design narrative was a Facebook (FB) social networking study in distance design learning at the Open University, UK. Two researchers set up the study to investigate the role of social networking in building a design community in design education at a distance.

Students of a 2nd level distance design course (T211) at the Open University where asked to join a Facebook (FB) group dedicated to the course learning objectives. 13 students voluntarily signed up to the group to explore the use of Facebook to facilitate their learning. These students were working towards completing their first Tutor-Marked-Assignment (TMA) in the course. These second level students had very different backgrounds, such as age and professional orientation.

The two researchers acted as facilitators of the group. In total 15 people participated in this group during the study period.

All participants were using FB before joining this study. While some participants set up a separate account, others simply used their personal account for the study.

TASK

The objective of the Facebook group was to explore the possibility of creating a community of learners for the specific course.

A number of tasks and activities took place in the FB group. Some of the tasks where initiated by students and some by the facilitators. For instance, students were invited by the facilitators to participate in an ice breaking exercise in which each member had to find a chair that would describe the personality of another member

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 183–187.

(student). Later, one of the students initiated a further task, which was to share thoughts about the progress of the first TMA.

Overall, the activities aimed to encourage social interaction among peers as well as learning about the course content.

The overarching aim in using social networking was to give students confidence in what they think and do in relation to the course by knowing what other students are doing.

ACTIONS

Initially, students were asked to share and discuss what they were doing while studying the course materials using all possible features that FB offers (applications, pictures, wall, forum, etc.) While the facilitators were more interested to see which activities emerged naturally on FB, students expected a certain degree of guidance in this study. Hence the facilitators set up some activities that were indirectly related to the course in order to influence students to do the same.

Firstly, in order to get to know each other, the facilitators set up an icebreaker session allowing students to get to know each other. Then students were encouraged to start discussions and exchange course-related information that interested them. Initially, student lead activities were often text-based. Then the facilitators inspired the use of other FB features, such as drawing applications. Initially this had a mediocre response, however, after the first TMA was handed in, a student shared pictures of a model of a chair that he had handed in for assessment and other students followed suit. They shared sketches and models that they had produced for their individual assignments and commented on each other's contributions.

RESULTS

Both the FB group space, which was set up for the study, and FB personal walls were used to reflect on the assignment and share the outcome of activities in relation to studying the course materials and feelings of studying on the course.

The initial ice-breaking event was a huge success. It got the students to look at each other's profile pages and find chairs that they thought the other student might like. In the group forum links to chairs were shared and discussed. This was a fun activity of near-synchronous interaction. It connected the topic of the course to getting to know more about the students by reading their background information and finding chairs that would suit. It also introduced the students to FB functionalities and populated the FB group with posts. Facilitators were the first to suggest chairs from online resources and students followed the same style of interaction after a few posts. The ensuing discussions still had introductory connotations, where students stated their expectations and also expertise that might contribute to the group discussion.

However, in this first activity a limitation of FB became apparent. It does not allow rapid, near-synchronous postings in the forum, identifying it as spamming.

The facilitators changed the study from a once-a-week meeting to continuous posting throughout the week. This discouraged some students from participating because being on FB more frequently was perceived as taking time off from studying the course materials. On the other hand, some students were very active, reflecting on studying the course materials in their daily personal status updates.

At first students relied on text-based discussion in the forum within the FB group. In the beginning they did not share much visual information of their design activities and process leading to the TMA. The facilitators tried to shift the text-based discussion to multi-modal discussions, acting as 'role models' for the students. This had little effect until after the TMA was handed in when a student took the initiative to share the TMA designs and engage in a discussion around the designs. Some other students followed suit and a critical, in-depth, discussion based on these artefacts evolved. Models of chairs uploaded to the picture gallery acted as icons to start discussions around ideas and processes in designing. Although not all students actively took part in these discussions, a positive role for discussions centred on visual/social artefacts posted in social network sites was identified. In their questionnaire responses all students mentioned the value of engaging in discussions around designs that were handed in for assessment. They felt encouraged to see what others were designing and saw a positive competitive role in the evolving discussions on artefacts.

Figure 1 below depicts the most important types of conversations or messages exchanged between students in the FB group. The identification of a type of conversation, or action, that played a central role for the whole network can be done by looking at how much that type of conversation, or action, is associated with participants that are highly connected (i.e. have many interactions with other participant*s*), or with participants that hold popular conversations. Technically this measure is referred to as 'eigenvector centrality' (Freeman, 1977) and it can be intuitively understood as a measurement of integration between different discussions and people. As this measurement suggests, the conversations developed around posted pictures created a point of connection for all the other types of conversations and helped link disconnected people together.

A few students in the study posted contextual information about what they were doing and feeling in relation to the study of the course on their personal walls. Their posts did not give out much content-related information such as results of hands-on activities in the course materials and reflections on learning. Instead, these contextual posts gave indications of where the student was in the reading and how happy or frustrated the student was. These students also replied within the FB group with contextual information that seemed to encourage others to engage further in a discussion.

Facilitators had to be careful not to give students who participated in this study an extra advantage in completing the TMA by offering extra tuition. This resulted in starting activities and discussions that were indirectly related to the course materials but provided no direct advantage to the students. However, students seemed to be more interested in gaining direct feedback on the TMA tasks. This created a conflict regarding to what extent the facilitators were allowed to contribute to the discussions.

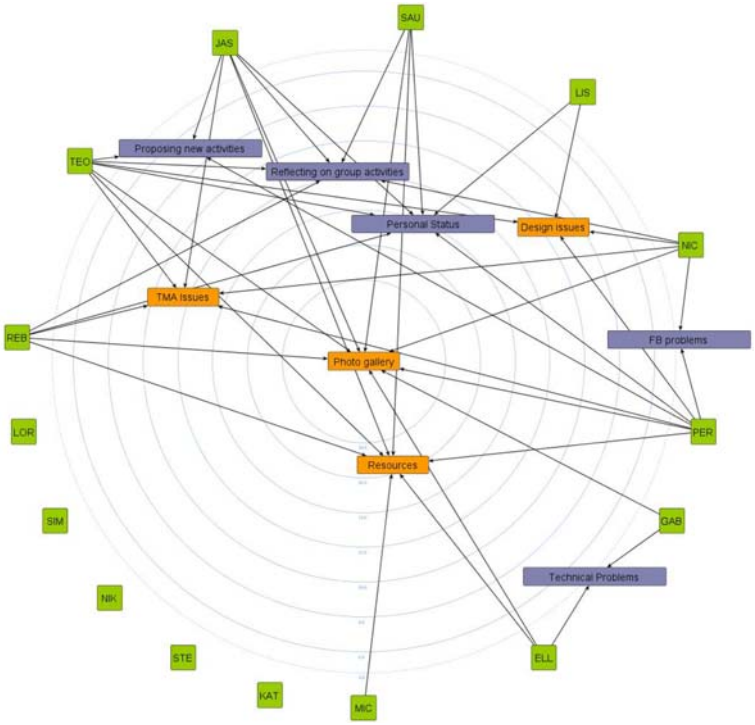

Figure 1. Mapping of conversations or messages exchanged between students in the FB group

LESSONS LEARNED

The most successful activities on FB were the ice-breaking exercise, the TMA and learning goal centred discussions, and discussions based on artefacts that were upload into the shared picture gallery.

The study was not linked directly to assessment. Students felt that they gained some additional insights into what other students were doing at a distance. Social networking was a voluntary and additional voluntary activity and therefore should probably not be linked to formal assessment.

On the other hand, students should be able to share all TMA relevant information without fear that others might steal their ideas. This could be encouraged through formative assessment of process i.e. participation in discussion rather than purely summative assessment of the outcome in TMAs.

However, assessing only the quantity of posts is not sufficient. Some students set up a lively discussion by just contributing one or two high-quality content posts, to which others reacted intensively and positively.

In-depth contributions (discussion of how-to's, expertise, course content) as well as contextual posts (feelings, course progress, thanks for posts by other students) are valuable elements to sustain online discussions. These posts interact with each other, and are interdependent. The socio-emotional component of social networking seems to stimulate the emergence of a community of learners as much as quality postings.

Ice breaking exercises link people with technology and the topic of learning in a fun way. They set the tone for the style of interactions and the development of relationships among people in the group.

Discussions around artefacts link people and ideas. They seem to create connection points for students that usually study alone at home.

Facilitators are role models. They should be integrated into the discussion as if they were simply more experienced peers, engaging in the same activities as the students. In fact, facilitators indirectly show students through their actions what they expect the students to do.

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3.2.1 PATTERN: ONLINE FORUM FOR E-LEARNING

SUMMARY

This pattern outlines the logical design structure and teaching practices involved in the creation of an online forum for a class of 5-30 participants.

PROBLEM

Students need to communicate with each other about the course (subject). How does one design a forum to facilitate and encourage collaborative learning?

Forces

The forces in tension in this pattern are:

- isolation from colleagues in an online environment
- lack of coaching, modelling, scaffolding from a tutor
- need for socialization
- need to stay 'on topic'
- a place for reflective practice
- ability for private versus public communication
- time constraints (time wasting) for both student and tutor
- usability frustrations.

CONTEXT

Many online forums for students currently exist. Due to their design, or the way they are used, many forums do not enhance student learning, and worse, may waste time and hamper students' efforts to collaborate and learn. An online environment for a student forum can be designed so that it meets certain baseline requirements, and therefore does not frustrate students, and potentially enhances the learning experience.

This document describes a 'baseline' design of the *logical structure* of an online forum. It is intended to be used by web designers as a 'best practice' forum structure, to ensure that all *logical elements* and *structures* are included. It does not specify any actual content, page layout, or look and feel. The document does, however, suggest

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 189–197.

ways that the forum should be used by course facilitators once the forum has been built and is in production.

For this forum design, it is assumed that the number of individuals (students) and posts (messages) will be able to be moderated (handled) by one facilitator (tutor), as is usually the case in face-to-face classes. This forum design is therefore intended for typical class sizes of 5-30 students. If there are fewer than five participants, we assume that the interactions would not be sufficient to warrant an online forum. If there are more than 30 students, there is the risk that too many threads and too many messages will cause information overload. Information overload would result in poorer learning outcomes, with students likely to complain that there were simply too many messages to read and keep up with.

The forum design also assumes that the class is not all online at the same time, in other words, the discussion is normally asynchronous. The class does not necessarily need to meet in person; the course could be fully online.

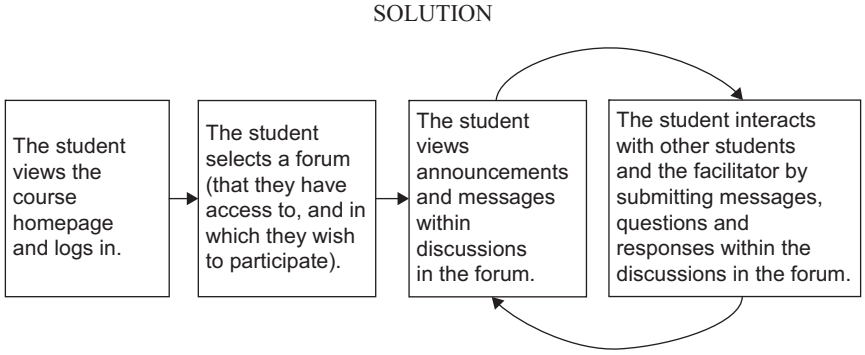

Figure 1. The high level process of using the 'baseline' online forum.

The high level process of using the 'baseline' online forum

The solution should have all basic 'housekeeping' elements so that the students are not hampered. These elements can be considered as 'hygiene-factors' for a basic, functioning forum.

What should the student be able to see and where is the content? Students should be able to see two types of content:

– announcements (posted by the facilitator or system administrator)
– messages (posted by both the facilitator and students).

Announcements are not part of the forum itself and are not discussed further. However they are an important method of communicating urgent information to students, particularly if the site is down for maintenance.

Messages contain the bulk of the content and are the source of interaction between students. Messages may contain:

– questions
– answers
– information
– pointers to other information sources
– rich media elements.

In order help students understand what kind of messages should be posted where, a sensible information structure should be designed by the course facilitator. The forum designer should therefore enable the content to be organised so students can see:

– multiple forums (e.g. different courses the student is enrolled in)
– multiple topics/discussions within a forum (e.g. Assessment, Social, Technical)
– multiple threads within one topic or discussion (e.g. Assignment 1, Week 3 Meeting)
– multiple messages within one thread (e.g. Extension for Assignment 1).

Who can see which pages in the site? The overall site should be designed so that there are two modes: the first is public i.e. not logged in and the second is private i.e. logged in. The first set of pages is available to anyone browsing the internet, and the second set of pages is only available once the student has logged in.

What are the interface/navigation elements that should be placed on every page? Every page in the public section should have the following logical page elements:

– login field (or button)
– menu navigation
– online status display
– search field (and/or button).

Every page in the private section should have the following logical page elements:

– logout button (or link)
– menu navigation
– online status display
– search field (and/or button)
– bread crumb links
– help link.

Which pages are public? Pages that should exist in the logical site structure are:

Home page, which is the first page a user comes to when they access the site. It is the starting point of a user's journey through the site. It may contain branding identification, login and navigation items.

Forum registration page, which allows a student to register in the database as a user of the forum. It records a login name and a private password so that other users of the forum can identify a user when they post messages. The registration process grants the user access to areas not available to non-registered users.

FAQ page, which contains frequently asked questions, such as how to register for a forum and who may register. It is similar to a help page, however it is much shorter as it is for a general audience, and also it is not specific help on the application or tool.

Which pages are private? The following pages are private:

Student home page, which is the first page a student comes to after they have logged in. This should contain the list of forums that are available to the student. One student may be enrolled in several subjects and therefore have access to multiple forums.

Student profile page, which allows students to reveal personal details about themselves if they wish. It contains fields where students can fill in information. It may contain information on location, interests, subjects studied etc.

Forum page, where students can see general announcements and a list of topics for discussion. The interface design should clearly denote any activity since the student last logged in (e.g. by using bold). Ideally a timestamp should be included with the time of the last activity. Under each discussion topic, it would be useful (space permitting) to show the most recent threads that have been updated. The forum page may also contain rich media elements.

Topic/discussion page, for each major discussion topic, there should be a separate page. For example, a separate topic or discussion page would be set up by the facilitator for 'Social' discussions so they are separated from course content. The purpose of the segmentation is to organise the material (i.e. messages) so that students can focus on the topic they are currently interested in. Each topic or discussion page will display the titles, and links to, the most recently updated threads (e.g. three to five most recently updated threads). Some examples of topics/discussions that would be set up by the forum facilitator are:

– 'Technical, Administrative and General discussion'
– 'Social discussion' or 'Chat' or 'Off-topic'
– 'Assessment' or 'Assignments'
– 'Part 1: Units 1-6' or 'The Social Impact of the Internet'.

Threaded message pages, which allow discussion messages to be organized in 'threads' where related messages are displayed beneath the original message. These replies are usually indented. In this way users are able to follow an online conversation between participants. The thread title is similar to a subject line in an email, as entered by a student or the facilitator. Some examples of thread titles are:

– 'Assignment 1 guidelines'
– 'Location for the meeting on Friday'

– ‘Help with finding a message that I posted last week’
– ‘Reflecting on the discussion from Week 1’
– ‘Extension of the deadline for Assignment 4’
– ‘Questions about content in Chapter 7’
– ‘Additional material for advanced students’
– ‘Feedback on this forum’.

The thread or message title contains a link to the associated message content. The discussion area will contain a number of thread or message titles. Each message should have a time stamp display, which shows the time and date that a message has been posted. This allows users to see how recent the messages are. Time stamp displays allow users to identify current and hot topics that are currently being discussed.

New Message Page, which allows the user to create a new message. It contains fields for the message’s title and message body. It may contain a field for a message subtitle.

Help pages, which contain a set of instructions as to how to use the site. These instructions may be for the entire forum or may be context sensitive, for the particular area that the user is in.

Other pages Forum administration pages that allow administrators of the forum to change the forum settings. These are not specified in detail in this document.

How many pages would be expected at each level? The recommended volume of items at each level of the hierarchy is in Table 1 below. You will need to discuss the details of this with your client. This is important for you as the forum designer to consider; if there are hundreds of links on a page, navigation elements such as ‘Next’ and ‘Previous’ will be required. It is also recommended to give the student the ability to choose how much is displayed on one screen (e.g. 10 messages? 50 messages? 100 messages? All messages?)

In the table below, ‘Av’ denotes an approximate average number of items that would be expected at this level in the hierarchy. It is not intended to be a mathematical average, but rather a number of items that one would usually expect for a functioning forum.

The diagram below (Figure 1) shows the result of the process of designing the pattern template using the ‘*pattern pack’*. It is included to demonstrate the outcome of the pattern-design process rather than for the specification. Please note that any text in this document supersedes the diagram below.

– Left and above the line indicates public pages.
– Left and below the line indicates private pages.
– Right hand upper corner shows elements that should be on all public pages.
– Right hand lower corner shows elements that should be on all private pages.

Table 1. How many pages would be expected at each level?

	Min	*Max*	*Av*	*Comment*
Forums	0	10	3	The minimum number of forums has intentionally been set at zero. Even if the student is not currently enrolled in any subject, for example if they are 'in-between' semesters, there is no reason to refuse access to the forum overview page. They will however see no links to any forums. The maximum of 10 is suggested, as any student is unlikely to be enrolled in more than 10 subjects simultaneously. It would, however, be quite common to be enrolled in two or three subjects at the same time.
/Topics/ Discussions	3	10	7	There should be a minimum of three topics in each forum, one for course content, one for technical assistance and one for social or general discussion. The labels (i.e. headings) for these discussions are not specified, however they should be sufficiently clear that they cover these general student needs. They should be clear enough that questions about the system, or about social events, are not posted within the discussion on course content. A fourth discussion that would be common is for 'Assessment', however it is not assumed that the subject will include any assessment. The recommended number of topics is seven, taking into account that there may be several topics for discussion within the one subject, and the assumed short term memory of humans can cope with approximately seven items or categories.
Threads	1	1000	n/a	There should be at least one posting to clarify the purpose of the topic/discussion. There is no suggested limit to the number of threads in any discussion. Arguably, once the number of threads reaches an upper limit of 1000, a new topic/discussion should be started by the facilitator.
Messages	1	1000	50	If any thread is started, it will, by definition, contain one message. The recommended average of 50 is purely a suggestion to the facilitator that a new thread could be started; the designer of the system should not assume any hard limit for the number of messages. A system-generated limit or database limit of 1000 messages would be reasonable, however the page flow for this is not described in this document.

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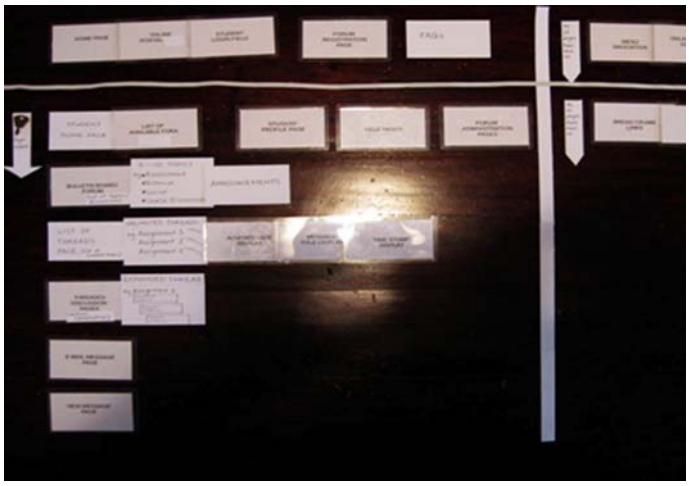

Figure 2. Designing the pattern template using the 'pattern pack.'

Teaching Strategies

The following teaching strategies are critical to the success of any online forum. Any potential facilitator of the forum should be trained in these principles and keep these in mind throughout the course. In addition, at the conclusion of the course, the facilitator should seek feedback on whether, or how well, they have been able to follow these principles. The principles below should guide:

– the announcements posted
– the actual messages, content and questions
– the timing of the messages
– the construction of the thread or 'subject line'
– the actual discussion topic structure
– any guidelines that are posted for online forum etiquette.

Create a calm and friendly atmosphere Creating a calm and friendly atmosphere means that interactions **o**n the forum should be kept friendly and with the minimum of 'flaming' or aggression. This is crucial to establishing trust by the students in posting in the forum. This helps draw out reticent students who would not otherwise post.

Don't dominate discussions; support student-to-student interaction Allowing students to support each other's learning is one of the main tenets of constructivism. By allowing students to answer each other's questions you not only afford opportunities for learning, you increase social interactions which add an often missing dimension in the e-learning experience.

Encourage social interaction One of the ways to getting students to know each other is by encouraging social interaction. Although these posts often seem 'off topic', these interactions establish relationships between course participants which are important for collaboration and co-operative learning. It also makes the experience of online learning richer and more engaging. The social interaction aspect is all the more important if group assignments are part of the course assessment. The group will need to work its way through the stages (forming, norming, storming, performing). Group performance will be enhanced if social interaction is encouraged.

Encourage students to critically analyze their own views and maybe rethink them Rethinking existing theories, revising them and forming new theories are some of the tenets of constructivism. Knowledge is formed by revising incorrect theories. In order to do this, existing theories need to be critically examined in light of the learning experience. By encouraging students to critically analyze their own thinking you allow opportunities for new knowledge formation.

Encourage peer feedback Social constructivism states that social interaction and knowledge formation go hand in hand. By encouraging peer feedback you afford opportunities for knowledge construction. It serves the function of allowing new ideas to be canvassed, for social interaction and, on a practical level, can reduce the tutor's dominance of the discussion and workload.

Ensure each message has a reply One way to encourage confidence and trust in the forum is to ensure that each message has a reply. It is not necessary that this reply comes from the tutor/facilitator/moderator. Interactions between students are to be encouraged.

Exploration One of the elements in the constructivist teaching cycle, exploration, is when students examine the subject and begin to form new theories. In a forum it is the facilitator's role to ensure that students are motivated to explore new theories and information, both by the structure of the course materials presented and the types of questions that are posed. Rich media content will allow enhanced online exploration of course material, however this is not specifically required; students can explore and examine content without rich media.

Formulate a process for deeper enquiry into the subject Formulating a process for deeper enquiry into the subject can be done by asking provocative questions, by perturbing students existing theories in order to get them to rethink them, and by asking open-ended questions. Taking the students out of their 'comfort zone' in terms of the subject being examined encourages new knowledge formation.

Give positive feedback By giving positive feedback, that is, by complimenting students when they have achieved a correct result, students are encouraged to

continue with their enquiry into the subject, and are kept on the correct line of enquiry. Indeed if the facilitator starts providing positive feedback, and sets this as a 'norm' for the group, then other participants will be encouraged to follow suit.

Make discussion objectives clear Giving clear direction as to what is expected of students in the discussion facilitates interactions. Students are given a clear path to follow so that they don't feel that the discussion is pointless. It is helpful to students if the first post in each discussion clarifies the purpose of that discussion topic.

Outline learner activity goals By outlining learner activity goals, students understand what they are expected to learn from the activity. This guides the student's thinking so that they 'stay on track' and don't waste time examining issues that are not related, or become bogged down or confused.

Reflection/reflective observation Reflective observation is the ability of learners to reflect on their own experiences from many perspectives. Reflection and reflective observation fall into both constructivist and experiential learning theories. It is through reflection that learners are able to move on to the next step, forming new theories from observations. The facilitator should not underestimate their role in encouraging reflection, both by the questions that are asked and by the discussion topics that are set up.

Scaffolding Scaffolding involves task definition, direct or indirect instruction, specification and sequencing of activities, providing learning materials, equipment or facilities. It involves assistance with planning, organizing and such assistance should be provided in a timely manner. The facilitator can 'scaffold' by providing clear task definitions as the first post in a series, or as part of the announcement section of a forum.

SUPPORT

Source

The source for the pattern online forum for elearning is the design narrative 'Developing and Evaluating a Design for an Online Forum' (3.1.1).

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3.2.2 PATTERN: CAN YOU HEAR ME

SUMMARY

When working in a virtual teaching environment one of the challenges is to understand the way that the available communication channels map out space differently to how we imagine real-world spaces.

PROBLEM

Teaching is a social, dialogic activity and when you are running a class in-world if you cannot hear what the instructor says, or the instructor cannot hear what the students say then the teaching and learning experience becomes opaque, or impossible to manage. But teaching spaces also need to be flexible so that if classes are broken into groups then each group should have their own working space that is free from interference by the others. Therefore when working in a virtual teaching space you need to understand the way that communication channels map out differently within the space which are often different to how we imagine real-world spaces.

Forces

Virtual environments such as Second Life provide a number of channels for communication, and some of these have limitations such as distance from source. In face-to-face settings being heard is still an issue but there are natural signals that help us spot this problem - for example you can see the instructor's facial expressions and movement and an instructor can likewise see the facial expressions of the students. In real-life we have good spatial awareness whereas in virtual spaces the setting may mimic familiar space but this does not mean communication works in the same way. In natural settings we can adjust the volume of our activity to create different 'sound spaces' within a single teaching setting so that we can carry out group work, or we can use barriers such as walls to divide groups. In virtual settings we have to adjust and accommodate to the particularities of the communication affordances.

CONTEXT

This pattern is derived from design narratives of the use of a MUVE (Multi-User Virtual World) but the underlying idea of mapping out conversational spaces can

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 199–201.

be applied to a number of virtual settings. It relates to any type of teaching and learning activity that is conversational or instructional e.g. running an immersive in-world workshop. This is equally applicable for audio based sessions and text-based sessions though the solutions may vary slightly.

SOLUTION

Choose your communication channels carefully and map their constraints so that as an instructor you know who can hear you and when. If you are using the main chat window as the primary communication channel respect the 20m range. You may need to mark out the limits of the range in a visible manner for example using a ground texture. You can back-up audio interaction with text. It is also possible to add animations to the avatar when you are speaking to add a visual signal. In virtual spaces you may find that you can use different communication channels to perform different functions. For example in Second Life avatars can either move beyond the 20m chat range for group work or you can use group chat channels to divide group work. Here you have the choice of then using a group channel to bring classes back together.

SUPPORT

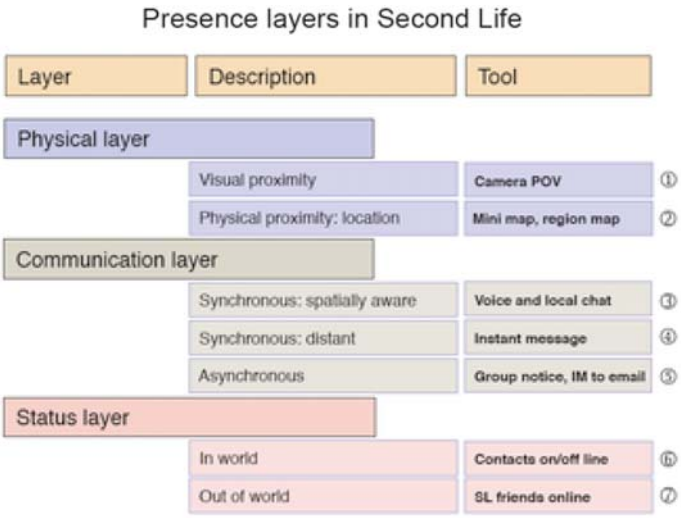
The sources of this pattern are the following design narratives:

– OpenHabitat (http://www.openhabitat.org/) pilot - philosophy students - split into small groups who worked in marked areas beyond the 20m chat range.
– MUVEnation (http://www.muvenation.org/) used 'Gypsy Decks' tool to automatically send seated groups to different in-world heights for group-chat.
– Elluminate - Institutional Innovation Online Conference.
– (http://ssbr0709.inin.jisc-ssbr.net/) used breakout rooms for group work sessions.

RELATED PATTERNS

CAN YOU HEAR ME leads to CONTROL THE FLOW (3.2.9).

NOTES



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3.2.3 PATTERN: CHOOSING THE RIGHT BLEND

SUMMARY

Web 2.0 applications are thought to carry potential for innovative collaborative activities, and are therefore often included in blended learning environments. The problem, however, is, to choose the right blend, as social software has to be complementary to already used learning management systems in higher education institutions. However, the rationale for the use of these systems often conflicts with the more 'fixed' mode of delivery underlying the use of LMS.

PROBLEM

There is both a desire and a drive in Higher Education to introduce web 2.0 tools into teaching and learning settings to increase student engagement with their learning and respond to, for example, reduced student interest in participating in online discussions and the problems faced by students with the restrictions imposed on them by certain LMS affordances. For example, there is no easy means for storing or compiling data for reflection or revision over a sequence of courses or over the long term, as learners do not own specific areas of the system and typically all learning and discussion materials are removed from the system after the end of a course (Cameron & Anderson, 2006). In addition, the learning objects used in LMSs are usually carefully structured sources of information, offering limited potential for interaction (Fitzpatrick, 2003).

As a solution to these issues the introduction of a range of web 2.0 tools is seen to offer a way of achieving goals and desired outcomes that include:

- enhancement or augmentation of asynchronous interaction during the course
- improvement of student interaction with their learning materials and associated activities
- creation of a more sustainable professional community after the end of the course.

The introduction of more open and distributed web 2.0 toolsets often conflicts with the existing rationale of a more 'fixed' mode of delivery underlying the use of LMS. This pattern addresses the problem of integrating web 2.0 tools in a formal higher education blended learning environment that typically includes the use of an organizational LMS.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 203–207.

Forces

The forces in tension in this pattern are:

– There is a desire to engage students in both formal and informal interactions but this process is hindered by organizational restrictions, for example, the existence of an LMS and certain obligations with regards to its use for posting of student work.
– Educators would like to encourage more complex collaborative activities but in most cases, face-to-face interaction in Higher Education settings are subject to time limitations that do not allow for this to be properly concluded. Blended learning environments seek to resolve this issue by offering the extra online time extensions that are needed yet they must present educators with realistic design choices; students may feel alien to the general web 2.0 rationale, involving a new knowledge culture based in active users able to create, modify, search and share information and knowledge (Freire, 2008). Students' enculturation in such a rationale is a multi-faceted process, demanding expert facilitation on technical problems, usability issues, and even new cultural and pedagogical principles.

Figure 1 below illustrates these forces, in relation to the goals set in this pattern:

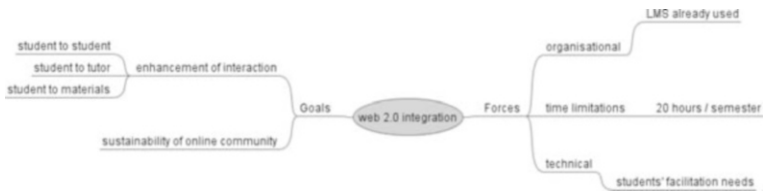

Figure 1. Forces.

CONTEXT

This pattern is applicable in blended learning environments implemented in higher education settings, in institutions allowing for a certain degree of freedom around the choice of digital learning tools and materials. It is not applicable in short-term, intensive seminars with strict learning objectives and specified, measurable outcomes.

SOLUTION

To enhance student-to-student and student-to tutor interaction during the course

Offer a range of web 2.0 applications, but be selective as to their focus and learning goals, as well as to the time allocated to each application. Students often spend too much time familiarising themselves with the technical aspects of each application, which often impedes their actual engagement with the task in hand. They also can't

estimate how much time to dedicate to each task. It is therefore useful to bear in mind these two factors and provide time management guidelines.

Offer concise and informative literature to support the web 2.0 pedagogical added value. It is important that the learning contract clarifies to the students a) why they should spend time and energy familiarizing themselves with web 2.0 applications and b) which learning outcomes will be achieved through the use of these tools.

Allow students to comment on their learning process, meanwhile providing proper discussion facilitation. In cases where an LMS is being used in parallel, confine its use to that of a 'formal repository' for students to refer to for content, but not as a primary space for their interactions.

To provide the seeds of a sustainable professional community after the end of the course:

Choose a tool which allows community development and allocate a significant time slot dedicated to its appropriation by the students. A technically simple solution can be blogs, linked and connected through a list.

There are also integrated platforms and services currently available to support this goal, for example NING (http://www.ning.com/), providing a set of web 2.0 functionalities in one single environment. Students can make profiles, write personal blogs, build a social network or a special interest group, chat synchronously and post their ideas on user-created forums.

This should be set as a priority so that the tools can be used in an organic way from the beginning of the course. In this manner the tool can be used both as a communication and collaboration space, and as a form of portfolio for student-produced materials. In the case where blogs have been chosen for this purpose, it is important to decide on an 'architecture for participation', for example, if there is to be one class blog and several student-owned blogs, a single class blog with students given administrator rights and so on.

To provide institutional guidelines for the use of web 2.0 technologies

During the experience, or on the basis of lessons learnt from previous attempts in the same institution, identify useful guidelines for the consolidation of e-learning in your environment (Valentini, 2010). These can also be informed by lessons learnt from other pioneer organizations involved in the adoption of web 2.0 tools and open paradigms (Freire, 2008).

SUPPORT

Source

The source for the pattern choosing the right blend is the design narrative 'Web 2.0 integration: disruptive or beneficial?' (3.1.3).

Supporting cases

Some supporting cases are:

- 'Wood for the Trees' by Steven Warburton
- http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Cases/Woodforthetrees
- 'Public – Private' by Janet Finley
- http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Cases/PublicPrivate
- Blogs, Community and Distance Learning' by Steven Warburton
- http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Cases/Blogscommuntyanddistancelearning.

Theoretical justification

The problems this pattern attempts to address are documented in the literature as follows:

The problem of 'talking about things while actually seeing them' This resonates with the issue posed by Mor (2009) in the pattern OBJECTS TO TALK WITH. It is also discussed in the introduction to the special issue of *Human-Computer Interaction*, where Churchill and Edison (2003, p. 1) write:

> When collaborators are separated and conversation is mediated, spanning distance or time, things often need to be represented so that they are visually, auditoraly and/or kinaesthetically (e.g. Brave et al., 1998) available to the conversants. Once representations are created, conversations proceed with carefully constructed arrangements and procedures for establishing and maintaining joint views.

The problem of longevity of 'master-class' communities Romiszowski and Mason (1996, pp. 408-9) introduce the term 'forced communities', to describe the problem of sustainability of course-based groups, after the end of their official academic duties. Downes (2004) states the problem:

> In more institutions than I can count, when a course is offered online, the discussion community is created with the first class and disbanded with the last. The community owes its existence to the course, and ends when the course does.

The problem of lack of institutional support for the integration of web 2.0 approaches Freire (2008, p. 5) refers to different fears explaining this lack of adaptation: a) the rejection by the users, personnel and students, b) the lack of an incentive system, c) the available pre-web 2.0 technology, and so on. Indicative of

the above (and other) problems and also informative for the field is the report written by Frankilin and Van Harmelen for JISC (2007).

RELATED PATTERNS

Assisting patterns:

- OBJECTS TO TALK WITH (Mor, 2010).
- KEEP IT SIMPLE (Mor, 2010).

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3.2.4 PATTERN: WEAR YOUR SKILLS ON YOUR SHIRT

SUMMARY

Your appearance reflects on your abilities.

PROBLEM

Potential collaborators need to know about each others' skills and abilities in order to consider collaborating on a task or to complete a certain task. The aim of this pattern is to baseline skills among potential partners before a task is approached together.

Forces

Potential collaborators might not know each other except from what they can see or read in the online environment. However, when they consider collaborating to improve efficiency in achieving a shared task or goal, how do they know what another person is able to contribute? Collaborators might have difficulty in establishing the veracity of the skills advertised by another user when only using words. Unless it is a writing skill that is being sought for this task or goal, users need to find a way to validate the skills that they and others bring into the collaborative setting. The form of representation needs to agree with the skills and abilities that need to be represented.

CONTEXT

This pattern can be used in visual virtual worlds and in virtual collaborative environments that allow a visual or multi-modal representation of the user. This also includes community environments or social network sites that offer customization of home pages for individual users or user groups. Depending on the need to represent a certain skill, such as writing or speaking, the pattern can also be applied to other collaborative environments, such as wikis for writing and audio forums for representing a speaking skill.

Potential collaborators in this context are non-anonymous users. This means, they need to be able and willing to show a part of themselves in terms of skills and abilities that form part of their online identity in this context.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 209–211.

SOLUTION

A user represents his or her abilities by using these abilities to represent themselves. This indirectly shows proficiency in the skills that might be required to achieve a certain task. For example, the visual representation of your avatar in 2D or 3D will show the extent of your visualisation skills and your ability to use necessary tools in this particular environment. A skilful and original textual representation of your personality indicates the extent of your writing skills. The representation of your skills needs to fit the requirements that are sought by others to collaboratively solve a task or reach a shared goal.

Within a virtual game environment, the users' skills might be gained or given, and can be personal skills or avatar based skills. The avatar might collect skills and show them as tools or the avatar might be designed or dressed in a way that shows a degree of skill in this environment.

Within social network sites, various visual representations of the user might indicate the proficiency of skills or wealth of experiences, such as pictures, links and written pieces. This allows conclusions to be drawn regarding the suitability of this user for a collaborative task.

SUPPORT

Source

The source for the pattern WEAR YOUR SKILLS ON YOUR SHIRT is the design narrative 'Facebook for Design Learners' (3.1.4). The scenario 'Visualising skills for collaboration in virtual worlds' (3.4.1) was developed using this pattern.

Theoretical justification

In terms of the Conversational Framework (Laurillard, 2002) this pattern relates to the activity of learners presenting their own conceptions, and in relation to Black and Wiliam's (2009) theory of formative feedback this is an example of key strategy 5 'Activating students as the owners of their own learning'.

There is a clear link between this pattern and ideas about self- assessment which form an important element of Black and Wiliam's (1998) account of formative evaluation, as well as theories of self- regulated learning. It is reflected in the 6th of Nicol's 'Principles of Good Assessment and Feedback Practice', namely 'Facilitate the development of self-assessment and reflection in learning' (Nicol & Macfarlane-Dick, 2006), which are themselves initially derived from a consideration of self-regulated learning.

Boud (2000) develops the concept of sustainable assessment to argue the importance of learners developing self-assessment in order to support lifelong learning.

In terms of virtual teams knowing the skills of your co-workers enhancing collaboration see the work of Shen (2007).

RELATED PATTERNS

- BASELINING SKILLS
- http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Patterns/BaseliningSkills.
- COLLABORATION FOLLOWS IDENTITY
- http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Patterns/CollaborationFollowsIdentity.

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3.2.5 PATTERN: SET GROUND RULES

SUMMARY

Laying the foundation for productive interaction and participation within synchronous text based chat sessions.

PROBLEM

Facilitating active participation in educational activities such as critical discussion depends upon both participants and tutors understanding the expectations placed upon them and providing a setting in which all involved can clearly articulate and express their views. We can create suitable virtual spaces but in online settings communication must overcome the constraints imposed by the lack of conversational cues that include for example non-verbal behaviour such as eye contact, facial expression, gesture, posture and body orientation, proximity, paralinguistics (tone, pitch, rhythm, timbre, loudness, and inflection) and humour.

Forces

Performing in virtual spaces where technologies mediate and obscure the immediacy inherent in face-to-face interactions can have both positive and negative implications. The distance can allow normally quiet voices to be heard by reducing the social barriers to group contribution, but the limited nature of synchronous text-chat can reduce the nuances, vibrancy and subtlety of conversation.

CONTEXT

This pattern applies to the many instances where communication is mediated by technology, particularly when using text-based chat. The general nature of this pattern means that it has relevance to both asynchronous and synchronous forms of interaction. This pattern is based on experience using text chat for running educational activities inside the multi-user virtual environments (MUVE) Second Life.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 213–216.

SOLUTION

Define a set of rules for participation:

- During structured and longer interventions from participants, like telling a story or giving a presentation do not interrupt the speaker until he/she finishes her turn and opens the space for Questions and Answers.
- Make sure that participants use simple keywords to precede expected types of interaction, for example, label questions with the word 'QUESTION' and comments with the word 'COMMENT'.
- Ask participants to try and keep their interventions short and to the point e.g. three sentences. Participants should break longer discourse into short chunks created with full sentences. Using a typing indicator as mentioned in CONTROL THE FLOW (3.2.9) can ease this process.
- Do not attempt to over control the chat and be prepared to allow questions or comments to flow freely throughout the session to maximize valuable participant contributions – ideas should be shared and encouraged. Asking participants to hold back with their questions and comments until the end can result in fewer questions or comments, which is a lost learning opportunity for everybody.
- Pause the presentation or session from time to time in order to give participants the chance to catch up with the chat and to reply to questions and comments. It can be frustrating when chat is lively and some are slow readers or typists. It's equally frustrating and demotivating if someone's contributions are missed and nobody reacts to them.
- Be prepared to give students handouts, or the slides, so that they have time to contribute more in chat instead of taking notes.
- Provide simple guidelines on how to use culturally accepted shortcuts and emotive symbolism. For example:
- using the @ symbol to direct conversation at individuals
- using acronyms such as AFK (away from keyboard), BRB (be right back), AFAIK (as far as I know), LOL (laughing out loud)
- using emoticons :) :(
- leaving space for others to finish typing
- using [square brackets] for comments off topic.
- using the ellipsis rule (typing '(...)') to indicate that you are continuing your argument.
- You should think before asking people to repeat - can you scroll back the chat history? However you can ask for clarifications, such requests are normally welcome.

SUPPORT

The following extracts are taken from stories submitted to the MUVEnation project (http://muvenation.org/) on 3D Virtual Worlds.

'I'm here, let me help you!' by Margarita Pérez Garcia

> This experience gave me the opportunity to reflect on several issues […] Disruption in open chat is also an issue. Setting up ground rules for communication seems to be a basic strategy in any conversational activity with a group.

Margarita commented on her story:

> I can identify two types of successful practice here: practices I've seen during the workshops and practices that I've seen in others workshops that can be applied to this […] Setting up ground rules for interaction (Questions and Answers) during the workshop seems to be a basic strategy in any conversational activity with a group. The instructor needs to decide whether questions are allowed in the main or in the back channel and when are they allowed.

'My first workshop experience in SL' (Second Life)' by Marilena Palvelli

> The other thought that I would make is that a lot of patience is needed and respect for different personalities and identities in SL. I think equally important, however, is to share a kind of netiquette, not only focussing attention on respect, e.g. not attacking or insulting the other person, to make me understand, but also a kind of collaborative netiquette so as educators we try to not simply achieve a goal which could be individualistic in our thinking only but also to be respectful and curious for the others, mainly because they have demonstrated a cooperative attitude to us. I believe that this capacity should be shared and applied, with due flexibility, in the most constant possible way, because we should be teachers and educators not only about contents, but above all about attitudes that only spread out pervasively with a coherent and consistent example.

RELATED PATTERNS

- Supported by CONTROL THE FLOW (3.2.9).
- Extended by MOOD OF THE MOMENT
- http://crossculturalcollaboration.pbworks.com/06+MOOD+OF+THE+MOMENT.

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3.2.6 PATTERN: TOUCH POINTS

SUMMARY

Students in design education at a distance are often working alone; they are geographically distributed, and have diverse cultural and educational backgrounds. One of the recurring challenges in this context is how to enable students to develop social self-awareness, that is, an awareness of how others (students and tutors) perceive, react, or share their own visions, actions and understanding. This pattern proposes a game where a distributed community of students creates a common environment or artefact. Other contributors to this pattern were Nicole Lotz, Georgy Holden, and Giselle Ferreira.

PROBLEM

'Lonely learners' in design education, that is students that develop their design skills and knowledge individually and predominantly in reflection on their own action, often lack an appreciation of the importance of the context within which a design problem occurs. So, one of the re-occurring challenges of design education at a distance is to enable students to develop *'social self-awareness'*, that is an awareness of how others (students and tutors) perceive, react, or share their own visions, actions and understanding. Learners at a distance need to develop a tacit knowledge of how individual beliefs, values and creations may be perceived by a social group of peers and tutors.

Forces

Lonely learners in design education at a distance are geographically distributed and students often study course materials individually at home. These materials may contain activities that require the production of artefacts. However, if artefacts are not contextualized within a professional or learning domain, the study materials may be less effective than anticipated in achieving the desired learning outcomes. A student's lack of experience in understanding the social implications of their activity can lead to conflicts or inconsistencies between the actual effects of their actions and their intentions, or their beliefs about the social environment, creating 'cognitive dissonance'.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 217–220.

CONTEXT

This pattern is applicable in situations where geographically distributed students are working alone on a task, and have diverse social, cultural and educational backgrounds. This is, for example, a typical situation in design education at a distance. However, this pattern may also be extended beyond design this context to any learning environment that seeks to establish a community of learners and a community of practice.

SOLUTION

Create a 'game-like' environment. More specifically, facilitate the development of a situation where a distributed community of students creates a common environment or social artefact.

A concrete example would be a virtual game where each player needs to envisage a city and propose the location and development of different types of buildings, each taking turns. In this scenario each student can propose partial changes to the 'social artefact' (i.e. the city) and then observe reactions from other students and tutors. Social artefacts such as this act as 'touch points' between students and tutors and can be used as instruments in order to create social-self awareness. Figure 1. An illustration of touch points. Students play together using a common environment in order to create a social artefact. Image adapted from Alexiou (2007).

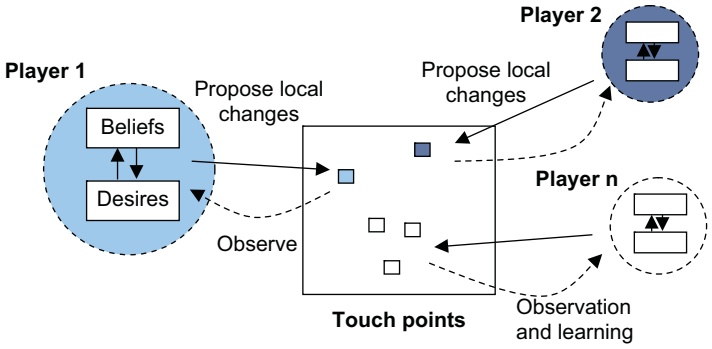

Figure 1. An illustration of touch points. Students play together using a common environment in order to create a social artefact. Image adapted from Alexiou (2007).

SUPPORT

Source

The source for the pattern touch points is the design narrative 'Facebook for design learners' (3.1.4). One of the core findings of this study was that certain types of interactions within Facebook could be identified that were particularly important for creating a well connected social network. The study revealed that the formation

of a collectively constructed e-portfolio (based on a common gallery of pictures and comments on individual assignments) was fundamental for the integration of different discussion topics and the development of interpersonal interactions. This photographic gallery was perceived by learners as a social artefact.

Theoretical justification

In campus based learning institutions student 'social self-awareness' is naturally developed even by simple informal activities. For instance, activities such as rearranging common spaces or working in a studio environment provide opportunities for students to develop social self-awareness. In the context of design education at a distance, the difficulty of creating social self-awareness could be attributed to the lack of 'touch points'. A 'touch point' being a physical object (or representation of a physical or conceptual object) whose ownership is distributed within a certain community. In this sense a 'touch point' becomes a 'social artefact'.

Learning through the creation of 'social artefacts' has educational advantages in that it cultivates the ability of students to advocate, defend and negotiate not only their own actions but also their beliefs and desires about a certain reality. In fact this type of learning is believed to contribute to the development of cognitive and behavioural skills that are fundamental for responding to 'cognitive dissonance' (Festinger, 1957). This term originated in Festinger's theory of social behaviour and suggests that people can develop behaviours and ultimately artefacts that are not necessarily consistent with their beliefs and values. He argues that the gap between a person's intentions, wishes and values and what is their actual, demonstrated, behaviour creates a tension which eventually will have to be resolved either by change of behaviour and action, or by a change of intentions and value system. The core objective of learning through a social artefact is to support students in acquiring the abilities that enable them to co-create artefacts with a value system that resolves this 'dissonance'.

Verification

A number of experiments like the one presented here, focussing on the construction of virtual cities as social artefacts, have been carried out by Portugali (1996). Similar online games have been created by Kalay and Jeong (2003). Computer simulations of the game can be found in Alexiou (2007) and Zamenopoulos and Alexiou (2003).

RELATED PATTERNS

– OBJECTS TO TALK WITH (Mor, 2010).

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3.2.7 PATTERN: DO AS I DO

SUMMARY

Students learn how to relate to one another and are enculturated into an online community and learning environment through the example of the moderator or facilitator. Other contributors to this pattern were: Nicole Lotz, Theodore Zamenopoulos, and Giselle Ferreira

PROBLEM

Participants are not always clear how they should relate to and engage with one another in an online learning situation.

Forces

Sometimes participants bring behaviours into an online learning situation from other contexts that may not be appropriate. This might include their use of language within a discussion or ways of working in a team. This can lead to the development of a prevailing communication style that may be unhelpful or even damaging to the learning experience. In a worst case scenario the moderator may also bring negative experiences or expectations into the learning situation and further constrain the educational objectives.

CONTEXT

The context in which this pattern can be applied includes Social Networking Sites, online discussion forums, and VLEs (Virtual Learning Environments) where participants share the same learning objectives but have a range of educational, social or cultural backgrounds and different experiences of online engagement. This pattern works particularly well in less structured learning situations where 'wicked' or complex problems are discussed (Knight, 2007).

SOLUTION

The moderator or facilitator of the learning space sets an example of appropriate and helpful engagement – not only in the early stages of the use of the learning space but

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 221–223.

also in situations where new learning goals are formulated or new tasks and ways of working and communicating are approached. In this way, the moderator stimulates new learning interactions by setting tasks that challenge the students, for example, by giving the first response to a provocative and complex design task. Here, the moderator offers a concrete example, of the way in which the task might be tackled.

In an online discussion, the facilitator might devise and ask a challenging question, to which partial but concrete advice is added either within the message or as response. This acts as a model answer for students to come up with other possible responses.

If the focus of participation extends to visual communication the facilitator would post and annotate an image, which then acts as anchor and model for further discussion. In annotating images, the facilitator would adopt a positive and encouraging tone and never belittle participant contributions.

SUPPORT

Source

The source for the pattern do as i do is the design narrative 'Facebook for Design Learners' (3.1.4).

Theoretical justification

This pattern is an example of the apprenticeship learning model and the relation of masters and students (Lave & Wenger, 1991). In doing what the facilitator does, students learn which behaviours, actions or skills are relevant in a task, or in a community of practice. They become enculturated and gain awareness about the values of a community.

RELATED PATTERNS

- CLASSROOM DISPLAY (Mor et al., 2010).
- COLLABORATIVE REFLECTION WORKSHOP
- http://warburton.typepad.com/files/PPW_2_1.pdf
- DRAW AND TELL
- http://warburton.typepad.com/files/PPW_2_1.pdf
- KNOW ME BETTER
- http://crossculturalcollaboration.pbworks.com/w/page/16658965/KNOW%20ME%20BETTER.

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3.2.8 PATTERN: NO TELLER WITHOUT LISTENERS

SUMMARY

A storyteller needs listeners who legitimate the relevance of the story by giving attention, non-verbal feedback or small agreements. Similarly in an online discussion, students that 'listen' need to legitimate the value of contributions to the community or group through some form of feedback (agreement, examples, or some form of contextualisation of the content). Positive feedback gives the poster authority in the group and confidence to continue posting. Other contributors to this pattern were Theodore Zamenopoulos, Georgy Holden, and Giselle Ferreira.

PROBLEM

A vibrant and stimulating discussion among students can sometimes be difficult to maintain in collaborative online learning. Contributions might be relevant but too few, or contributions are manifold but irrelevant to the community or topic of discussion. Discussions might die out due to low numbers of contributions or due to lack of quality contents in contributions.

Forces

In online discussions, a high number of contributions do not automatically sustain a discussion. Students might quickly lose interest in participating in the discussion if these contributions are irrelevant and off-topic. However, a discussion that only contains content-specific detailed contributions might be slow in evolving due to the time it takes to formulate a high quality contribution.

Some students lead discussions through their interest or expertise in the topic. Others might value and learn from these contributions but only tend to 'listen' or 'read' because it is not their area of expertise.

'Listeners' are often perceived as passive learners and only those who contribute their expertise are perceived as active learners.

CONTEXT

The problem can occur in asynchronous discussion forums or social networking sites and also in synchronous online meetings within a learning group or community.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 225–228.

The discussions within these settings are learning goal orientated i.e. focus on completing a learning task or discussing course readings. This problem appears both in discussions where a tutor acts as a facilitator and in discussions that are part of self-directed learning. Students in distance higher education often have diverse professional or social backgrounds therefore using this pattern offers students the opportunity to not only contribute expert knowledge but also contextualise contributions within their own domain.

SOLUTION

Online discussions need to strike a balance between topic-specific, detailed contributions and responses that contextualise the contents of the contribution. Contextual responses may state examples, questions or simple agreement. This confirms the value and usefulness of the original detailed contribution and also encourages others to make similar contributions.

The tellers need listeners to legitimate their 'stories'. Both roles are equally important to sustain a discussion. The quality of the teller's contribution might stem from a certain expertise, experience or knowledge background that others do not have. The contribution should be oriented towards achieving the shared learning goal, i.e. how something can be done, how a theory can be understood, etc. However, the listeners do not remain quiet. They respond by giving examples of how this content was, or might be, applied. They ask clarifying questions or simply acknowledge the usefulness of the content by stating how it helped them to see something that they did not see before.

This quality-quantity, content-context balance not only gives the student who posted a good quality, content-specific message the confidence to repeat this but it also provides a good example for others to follow and so contribute quality posts when their expertise or experience allows.

The mechanism behind this dualism is authority. Authority has to be earned by legitimating the experience or expertise on a topic that contributes to the learning goal of the group or community. Tellers and listeners co-construct authority in this way.

If a tutor facilitates a discussion, the tutor often is perceived as the authoritative figure. When a tutor wants to use this pattern there should be two facilitators present that take on the roles of teller and listener respectively and in this way provide a good example for the students to follow. After giving the example, the facilitators could ask students to share specific knowledge, experience or expertise and contextualise this contribution, again for other students to follow their lead.

SUPPORT

Source

The source for the pattern NO TELLER WITHOUT LISTENERS is the design narrative 'Facebook for Design Learners' (3.1.4).

Theoretical justification

Power and authority are constructed in discourse through spoken and written language, signs and symbols, that is everything that is used to communicate ideas and construct meaning (Foucault, 1972). A quality, in-depth post of expertise to a forum only becomes accepted knowledge when it is legitimized through social processes of response. Therefore, in online learning environments knowledge creation is related to the negotiation of power in forum posts. The poster of expert knowledge gains power through the legitimization of their expertise. This encourages other learners to also share their expert knowledge when they can.

Within a particular situation, group or setting, some people might take on a role of 'listener' and others might take on a role of 'teller'. Research has shown that the story that is told by a main narrator is co-constructed by the listener (Bevelas et al., 2000). Bevelas and colleagues maintain that listeners, through their specific responses, have a very strong effect on the performance of the 'teller'. If this is applied to online learning situations, then listeners who post contextual messages that might not be in-depth or detailed but they add to the main story or illustrate specific points are enhancing the performance of the 'teller'.

A review of Computer Mediated Conversation (CMC) in learning environments showed a need for students to develop a shared purpose (Tolmie & Boyle, 2000). Schrire (2006) found conversations that were initiated by students showed a 'relative balance among the three move types – initiate, response and follow-up – although response moves still accounted for the largest proportion of moves' (p.65). The high rate of response-posts showed that student could relate to the original post, which furthered collaborative learning and the sense of a shared purpose.

RELATED PATTERNS

- SET GROUND RULES (3.2.5): Laying the foundation for productive interaction and participation within synchronous text based chat sessions.
- TOUCH POINTS (3.2.6): This pattern proposes a game where a distributed community of students creates a common environment or artefact.
- DO AS I DO (3.2.7): Students learn how to relate to one another and are enculturated into an online community and learning environment through the example of the moderator or facilitator.

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3.2.9 PATTERN: CONTROL THE FLOW

SUMMARY

This pattern addresses the mechanics of synchronous text-based chat sessions for effective communication within online teaching sessions.

PROBLEM

In online educational settings we often use synchronous text-based chat as a replacement for face-to-face sessions to facilitate synchronous dialogic activity but when there are more than a handful of active participants in a single chat space the rapid and unthreaded flow of exchanges make it difficult to maintain a coherent and productive conversation.

Forces

The majority of online spaces that are used for learning and teaching provide opportunities for synchronous interaction in the form of text-based chat. Chat spaces are democratic in that anyone can post comments as and when they feel. On the one hand this freedom can be empowering for participants yet on the other it can reduce the fidelity of the conversation when large numbers of participants are involved. Organisation, management, etiquette and maintaining a good signal to noise ratio all play a role in successfully navigating synchronous chat to achieve prescribed learning outcomes.

CONTEXT

Although this pattern was developed from design narratives of working with text chat in Multi-User Virtual Environments (MUVEs), it is extensible enough to be used in any situation where groups of people are actively participating in text-based synchronous communication within a single chat space. There is not an exact figure for where the number of participants becomes critical and renders conversational flow difficult to follow. This will depend on the type of activity, its defined purpose, the level of engagement that is being sought and the confidence of the users. For

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 229–233.

example conference style presentation formats will differ from small group teaching activity. We do note that with even as few as five to six members within the group chat can become constrained.

The synchronous text-based discussions that this pattern applies to can be found in a variety of computer-mediated environments including: internet chat rooms; instant messaging services; back channels within audio and video conferencing tools; virtual whiteboard applications; visual and 3D chats such as virtual worlds. What we describe as a chat room or chat space can be broadly described as a tool that supports text entries into a common text space or window that are differentiated by individual usernames and a time-stamped chronology.

SOLUTION

Apply structure to the chat by:

- Explicitly creating a moderator role. This can be the tutor or an assistant, or the role can be assigned to one of the participants. The function of the moderator is to help monitor and manage the conversation and where appropriate bring questions and comments to the attention of the presenter or session leader.
- Ensure that participants are aware of the rules for participation by applying the SET GROUND RULES (3.2.5) pattern.

Exploit the technical affordances of the system:

- Turn-on a typing indicator. For example in the MUVE Second Life (SL) there is an animation for 'typing-hands' and in Skype the indicator is a 'writing-pen' animation.
- Ask participants to mute spammers so that what they say will not show up in the chat window, and be prepared to ban or eject them if necessary.
- Ask participants to refrain from using chat gestures e.g. ASCII code that fill the chat area and make it difficult to follow the conversation.
- If you are working in a public chat space then move the conversation to group/ instant messaging (IM) chat if it is being polluted by the presence of unwanted guests.

Moderate the flow:

- Throttle the conversation by turn taking, or use a tool such as a question queuing script.
- Filter by setting the interaction rules and only react to those comments and questions that follow the set rules e.g. only if they are labelled 'QUESTION' or 'COMMENT' or only if they have been sent via IM to the moderator or assistant.

– Use break-out activities to keep the size of the group manageable. Different virtual spaces offer different permutations and check that you understand the possibilities for this by referring to the CAN YOU HEAR ME (3.2.2) pattern.

Manage interruptions:

– Deal with late arrivals and early leavers.
– Participants who arrive late should not interrupt the discussion. If someone arrives late either this person remains silent and joins the group discussion or says a single 'Hi all' or '/me says hello to all and joins the meeting'.
– An IM to the tutor or to the responsible person will allow the necessary information and clarifications about the ongoing activity to be sent via the back channel.
– Participants who leave early should simply end by saying 'I am leaving because I need to go to bed' and say 'good meeting' or similar, or remain silent.

SUPPORT

Source

The source for the pattern control the flow is the design narrative 'Online teacher training in a web 2.0 setting' (3.1.2) which describes showing language teacher trainees the possibilities of using technology in language education in two online sessions.

Supporting cases

The following snippets are taken from stories submitted to the OpenHabitat (http://www.openhabitat.org/) and MUVEnation projects (http://muvenation.org/) on 3D Virtual Worlds.

'Tommy Cooper?' by David White, TALL, Oxford University

> When Oswy was asked for his initial opinion his hands started to move in that Tommy Cooper style that indicated typing. The rest of us looked on. After about a minute we realized that we had no idea of just how much Oswy was likely to write. If he was a fast typist then we were looking at quite a long paragraph. After about 1min 30secs we asked if he was ok but of course he was typing and so couldn't respond.
>
> It dawned on us that a reasonable answer to the question could legitimately be quite substantial. At this point I suggested to the tutor (who was in the same real life room as me) that we could ask all of the students to type their answers in at the same time and then hit enter as we went round the group. After Oswy finally responded we suggested this and it seemed to work ok.

'Building interactive boxes and word balloons for language learning games and fun!' by Carmela Dell'Aria

> The communication channels were used mostly by local chat and less by voice, but there was an unordered use of IM. Even if I had a notecard reader for delivering instructions I didn't use it.
>
> Finally, you can have planned the best tools, written complete instructions, managed technical aspects but remember….
>
> … YOU CANNOT MANAGE PEOPLE AS WELL AS OBJECTS!
>
> We're unpredictable and so different even when we think we have the same skills and abilities, and share the same objectives and ideas … this makes a difference to all our experiences. But after living, socializing, learning, researching, experimenting and teaching in SL for about 2 years I can tell you this was another challenging and unique experience!

Among Carmela's comments on her story:

> Participants […] should not to try to interrupt the flow of conversation (if they arrive late).

'I'm here, let me help you!' by Margarita Pérez Garcia

> This experience gave me the opportunity to reflect on several issues […] Disruption in open chat is also an issue. Setting up ground rules for communication seems to be a basic strategy in any conversational activity with a group.

Margarita commented on her story:

> I can identify two types of successful practice here: practices I've seen during the workshops and practices that I've seen in others workshops that can be applied to this […] Setting up ground rules for interaction (Questions and Answers) during the workshop seems to be a basic strategy in any conversational activity with a group. The instructor needs to decide whether questions are allowed in the main or in the back channel and when are they allowed.

My first workshop experience in SL' by Marilena Palvelli

> The other thought that I would make is that a lot of patience is needed and respect for different personalities and identities in SL. I think equally important, however, is to share a kind of netiquette, not only focussing attention on respect, e.g. not attacking or insulting the other person, to make me understand, but also a kind of collaborative netiquette so as educators, we try to not simply achieve a goal which could be individualistic in our thinking only but also to be respectful and curious for the others, mainly because they have demonstrated a cooperative attitude to us.

Theoretical justification

Littlejohn and Peglar (2007) present a list of drawbacks for participants in synchronous communications: knowing whose turn it is to speak; the uncertainty of whether anyone is actually listening; time lags in audio and video; technical difficulties; time difference for those in different time zones; (and for text chat particularly) identity confusion.

Turani (2007) presents a classification of the most popular techniques for synchronous collaboration by type of communication and description of activities for each of the 13 techniques described: Informal Group Discussion, Round Table Discussion, Brainstorming, Group Nomination, Debate, Jigsaw, Pro/Contra, Think Pair Share, Pyramid, Buzz Group, Role Play, Case Study, and Team Pair Solo.

RELATED PATTERNS

– Preceded by SET GROUND RULES (3.2.5).
– Strengthened by CAN YOU HEAR ME (3.2.2).

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3.3.1 SCENARIO: VISUALISING SKILLS FOR COLLABORATION IN VIRTUAL WORLDS

INTRODUCTION

This section presents a single scenario that was constructed during the EU funded project MUVEnation (http://www.muvenation.org/) that explored the use of social 3D multiuser virtual worlds for learning and teaching in compulsory education. The aims of this project were to address emerging needs in training future teachers such that they are equipped with a set of skills and competences to successfully deploy technologies for enhanced learning. This initiative was part of the delivery of an online programme that addressed new areas and trends in TEL that were expected to become mainstream over the coming years where concrete solutions are expected to improve the integration of learning technologies with curriculum development. Ultimately, creating new models for collaborative learning in virtual environments, with teacher training being part of the problem and part of the solution.

SITUATION

The setting for this scenario is based on the project's exploration of the possibilities for the use of virtual worlds in education through an active learning programme of teacher training inside the Massively Multi-User Virtual Environment of Second Life. There was a strong awareness of the broad challenges of using a MUVE that include:

- it is removed from face-to-face learning experiences
- a sense of dislocation from familiar physical spaces and social codes
- the need for enhanced digital literacies
- taking on an assumed identity
- realisation that induction into the environment does not necessarily mean that learners can benefit from their affordances
- learning tasks and activities must be carefully designed to exploit the attributes of such an environment.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 235–238.

TASK

The project was driven by a peer-to-peer learning programme incorporating a series of *cooperative and collaborative activities* inside and outside of Second Life. Yet, from work on a related project - OpenHabitat - that examined collaborative work based on art and design project briefs, it was clear that collaboration was not a straightforward or natural activity (Warburton & Pérez Garcia, 2009). This therefore raised the issue of how to effectively facilitate cooperative and/or collaborative activities between participants in a virtual space knowing that successful collaboration requires articulated knowledge about the skills and abilities that others bring to a team.

PROBLEM

Potential collaborators need to know about each other's skills and abilities to complete a certain task. Potential collaborators might not know each other except from what they can see or read in the online environment. However, they consider collaborating in order to become more efficient in achieving a shared task or goal. How do they know what another person is able to contribute? Collaborators might have difficulties to establish the truth about advertised skills by another user using words only. The form of representation needs to agree with the skills and abilities that need to be represented.

PATTERN

Use the design pattern WEAR YOUR SKILLS by Lotz and Mor (3.2.4) to stimulate a design solution that takes advantage of the visual and in-world manipulative building possibilities offered by the virtual space of Second Life. The key elements of this pattern as used are noted below.

SOLUTION

A user represents him or her and their abilities using their abilities. This shows indirectly proficiency in skills that might be required to achieve a certain task. The representation of your skills needs to fit the requirements that are sought by others to collaboratively solve a task or reach a goal.

The design solution created using the above pattern was based on the following key ideas:

– allocate each participant a personally owned space within the virtual world
– each individually owned space is then used as a place for developing a personal visual portfolio of the participant's skills and abilities.

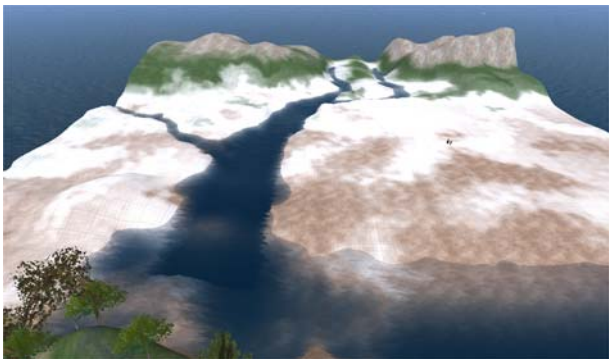

Figure 1. An empty Second Life island ready to be divided into individual land areas for the project participants.

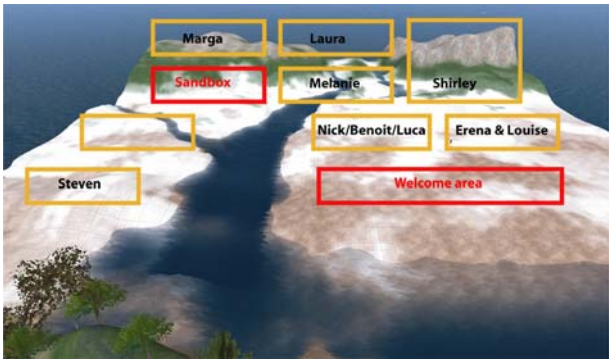

Figure 2. Division of island into defined areas with assigned ownership.

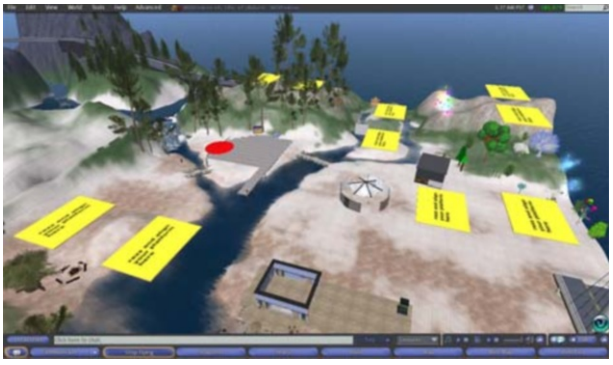

Figure 3. Creation of platforms for participants to build their virtual studios.

Figure 4. A visual studio under construction.

To scaffold the participants in the production of their virtual studio and to provide a standardised view on their skills and competences, a series of micro-challenges were used to drive the creation of visual portfolios that included:

– 'Curating the digital self' – a short activity to describe in objects, texts and images various aspects of yourself in a digital format.
– 'Almost famous' – a short activity to re-create your avatar in the form of a famous or well known person or character.
– 'SL tools exhibition' – a small project to identify and then bring to exhibition a selection of tools that can be used in an educational setting e.g. a virtual whiteboard.

The development of the visual studio acted as a type of ePortfolio and comprised audio, video, text, images and scripted objects. The success of these virtual ePortfolios was measured by their ability to be used as:

– a form of visual self-profiling
– a display for abilities such as building, using in-world tools, scripting, design
– a space in which to develop enhanced digital skills and competences
– a base from which successful teams could be created that worked not only within Second Life but across the other learning platforms that were used during the project e.g. Wiki spaces.

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4. ASSESSMENT AND FEEDBACK – OVERVIEW

INTRODUCTION

This section of the book looks at patterns for assessment. The term assessment is used here in an inclusive way, to comprise both summative and formative assessment, and so also covers what is often called 'feedback'.

The starting point for the work in this section was the JISC funded project 'Scoping a vision for formative e-assessment' (Daly, Pachler, Mor & Mellar, 2010; Mor, Mellar, Pachler & Daly, 2011; Pachler, Daly, Mor & Mellar, 2010; Pachler et al., 2009) which looked at patterns for formative assessment in Higher Education and produced ten example patterns: CLASSROOM DISPLAY; FEEDBACK ON FEEDBACK; NARRATIVE SPACES; OBJECTS TO TALK WITH; ROUND AND DEEP; SHOWCASE LEARNING; SOFT SCAFFOLDING; TRY ONCE, REFINE ONCE; WEAR YOUR SKILLS ON YOUR SHIRT; USE MY STUFF.

Four of the eight patterns in this section are developments of patterns from this project (FORMATIVE EXCEPTION: CLOSING THE LOOP FOR EXCELLENT STUDENTS; GENERATE & USE AGREED STRATEGIES; FEEDBACK ON FEEDBACK; TRY ONCE REFINE ONCE) and four (BLENDED EVALUATION; CHAOTIC MULTIPLE CHOICE TEST; E-GEO-ASSESSMENT; HINT ON DEMAND) are developed independently. Two other patterns from the project are presented elsewhere in this book: SHOWCASE LEARNING (1.2.3) and WEAR YOUR SKILLS ON YOUR SHIRT (3.2.4).

We have identified two previous collections of patterns for assessment and feedback, the first is a set of patterns for feedback from the Pedagogical Patterns Project (Bergin, 2006; Bergin, Eckstein, Manns & Sharp, 2002; Eckstein, Bergin & Sharp, 2002). This collection is summarised in Table 1, where the first column indicates the teacher's objective, and the second column suggests patterns that will help reach this objective.

The second set of patterns is quite different in focus. They were produced by the Principled Assessment Designs for Inquiry group (DeBarger & Riconscente, 2005; Mislevy et al., 2003; Seeratan & Mislevy, 2009) in order to guide the design of specific assessments of inquiry-based learning. These design patterns are intended to:

> integrate knowledge about what is important to assess within the structure of an assessment argument, in a format that readily guides task creation and assessment implementation. Each design pattern sketches what amounts to a narrative structure concerning, but not limited to, the knowledge, skill, or

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 239–244.

Table 1. Feedback patterns. (Bergin et al., 2002)

Objective	*PATTERN*
You want to ensure that the participants understood the topic.	FEEDBACK, DIFFERENTIATED FEEDBACK, TRY IT YOURSELF, KINDS OF EXAM
You want participants to apply the theory they've learned.	TRY IT YOURSELF, SELF TEST
You want participants to trust in their own knowledge.	OWN WORDS, PEER FEEDBACK, EMBRACE CORRECTION, PEER GRADING, STUDENT ONLINE PORTFOLIOS
You want to provide feedback that motivates the participants.	FEEDBACK SANDWICH, DIFFERENTIATED FEEDBACK, EARLY WARNING, GOLD STAR
You want to make the participants less dependent on yourself.	PEER GRADING, EMBRACE CORRECTION, STUDENT ONLINE PORTFOLIOS
You want to ensure that participants learn from their own experience.	EMBRACE CORRECTION, GRADE IT AGAIN SAM
You want to make the value of gained knowledge visible.	STUDENT ONLINE PORTFOLIOS, GOLD STAR
You want participants to be able to prepare for the exam.	SELF TEST, MOCK EXAM
You want to ensure fair (individual) grading.	FAIR GRADING, FAIR PROJECT GRADING, KEY IDEAS DOMINATE GRADING, GRADE IT AGAIN SAM
You want to grade teams fairly.	ONE GRADE FOR ALL, PEER GRADING, FAIR TEAM GRADING
You want to know if you and the course were useful for the students.	ACQUIRE PARTICIPANTS' FEEDBACK, ANONYMOUS FEEDBACK

> abilities (KSAs) one wants to address (i.e. Focal KSAs), other knowledge, skills, and/or abilities that may be required by the task (i.e. Additional KSAs), the kinds of observations that can provide evidence about the acquisition of the specified KSAs (i.e. Potential Observations), features of task situations that can evoke the desired evidence about the target KSAs (i.e. Characteristic Features), and features can be varied in order to shift the difficulty or focus of tasks (i.e. Variable Features). (Seeratan & Mislevy, 2009, p. 44)

Examples of design patterns from this group include patterns for the assessment of: BUILDING KNOWLEDGE REPRESENTATIONS; UPDATING, ELABORATING, & CORRECTING KNOWLEDGE REPRESENTATIONS; USING KNOWLEDGE REPRESENTATIONS; RECOGNIZING AND PRODUCING EQUIVALENCE OF MEANING; RE-EXPRESSING INFORMATION (Seeratan & Mislevy, 2009).

PATTERNS IN THIS STUDY

Framework

In the project 'Scoping a vision for formative e-assessment' we adopted Black and Wiliam's framework of five key strategies for formative assessment (Black & Wiliam, 2009):

- engineering effective classroom discussion, questions, and learning tasks that elicit evidence of learning
- providing feedback that moves learners forward
- clarifying and sharing learning intentions and criteria for success
- activating students as owners of their own learning, and
- activating students as instructional resources for one another.
- These strategies can be represented in a table as shown in Table 2.

Table 2. Aspects of formative assessment (Black & Wiliam, 2009)

<table>
<tr><th></th><th>Where the learner is going</th><th>Where the learner is</th><th>How to get there</th></tr>
<tr><td>Teacher</td><td rowspan="2">Clarify and share learning intentions</td><td>Engineering effective discussions, tasks and activities that elicit evidence of learning</td><td>Providing feedback that moves learners forward</td></tr>
<tr><td>Peer</td><td colspan="2" rowspan="2">Activating students as learning resources for one another</td></tr>
<tr><td>Learner</td><td>Understand learning intentions</td></tr>
<tr><td></td><td>Understand and share learning intentions</td><td colspan="2">Activating students as owners of their own learning</td></tr>
</table>

We found this table useful to classify and hence clarify the design narratives and patterns that we found in the 'Scoping a vision for formative e-assessment' project (see Pachler et al., 2009), and so we have chosen to use the same approach in order to structure the discussion of the eight patterns in this section.

TEACHER – Engineering effective discussions, tasks and activities that elicit evidence of learning

There are three patterns (BLENDED EVALUATION, CHAOTIC MULTIPLE CHOICE TEST, and E-GEO-ASSESSMENT) and their associated design narratives which fall clearly within this category. Each of these patterns attempts to support the development of specific forms of assessment, the emphasis of these patterns is on providing evidence of learning.

BLENDED EVALUATION by Oswald Comber and Michael Derntl (4.2.1) is a pattern that brings together a variety of forms of evaluation (self evaluation, peer evaluation and instructor evaluation) in the assessment of a course. The source for this pattern is the design narrative 'Web Engineering' (4.1.1) in which students were offered the possibility of carrying out team project work assessed using a mix of self evaluation, peer evaluation and instructor evaluation.

CHAOTIC MULTIPLE CHOICE TEST by Sus Lundgren (4.2.2) is a pattern designed to reduce guessing in multiple choice question tests and to reduce effort in test construction by constructing the test so that the ratio of correct answers is high (e.g. 50%) and so that correct answers are unevenly distributed (that is a question may have zero, one or more than one correct answer options). The source for this pattern is the design narrative 'Adding a Twist to the Multiple Choice Test' (4.1.2) in which a multiple choice-test was constructed so that it contains a fifty-fifty ratio of correct to incorrect answers, which were unevenly distributed. Correct answers were awarded positive points, but incorrect answers were awarded negative points.

E-GEO-ASSESSMENT by Patricia Santos, Davinia Hernández-Leo, Toni Navarrete, and Josep Blat (4.2.3) is a pattern in which an educational technology standard for assessment is combined with an open web map service (WMS) in order to create types of questions not possible with paper-based tests in order to enhance the assessment of geographical skills. The source for this pattern is the design narrative 'Assessment of Geographical Skills Using Interactive Maps in an e-questionnaire' (4.1.3) in which QTI (IMS Question and Test Interoperability specification) and Google Maps are used to create e-questionnaires to assess geography-related skills.

TEACHER – Providing feedback that moves learners forward

The emphasis in this second group of patterns is not so much on determining what students can do as in finding ways of moving students forward.

In the pattern feedback on feedback (4.2.4) Denise Whitelock examines the issue of improving tutors' feedback to students so that it provides opportunities to improve the learning experience, comprising constructive feedback to improve learning as well as socio-emotive feedback. Tutors are supported in doing this by providing feedback on the feedback they give. The source of this pattern is the design narrative 'Open Mentor' (4.1.4).

In the pattern FORMATIVE EXCEPTION: CLOSING THE LOOP FOR EXCELLENT STUDENTS (4.2.5) Stylianos Hatzipanagos addresses one particular aspect of improving feedback to students, namely providing feedback to students who are doing well on a course, feedback that would help these students to replicate this performance across different contexts and situations. The source of this pattern is the design narrative 'A tutor's journey' (4.1.5) which is an account of the context in which the author began to be aware of the importance of this problem, and of the steps he took to address it.

PEER – Activating students as learning resources for one another

There is just one pattern in this collection which activates students as learning resources for one another, that is GENERATE & USE AGREED STRATEGIES by Mary Webb (4.2.6). In this pattern students review and develop their own strategies for tackling a set of tasks through a series of small group and whole group interactions that lead to a shared understanding and recommendations for strategy. The source of this pattern is the design narrative 'Reading Academic Papers' (4.1.6) in which beginning teachers were being taught how to read academic papers.

LEARNER – Activating students as owners of their own learning

Two patterns in this collection can be interpreted as adopting strategies which seek to activate the students as owners of their own learning: TRY ONCE, REFINE ONCE and HINT ON DEMAND. While neither pattern incorporates strong elements of learner autonomy they are both examples of where some of the control of the learning process is being handed over to the students.

The pattern TRY ONCE, REFINE ONCE by Aliy Fowler (4.2.7) describes a two-step question-answering system which encourages students to consider their initial answers to problems carefully and subsequently, on receiving feedback on their errors, to give careful thought to the refinement process. The pattern is derived from a number of examples of technology support for language learning in which an enhanced form of string comparison was used to detect errors in the students' responses.

In the pattern HINT ON DEMAND by Marc Zimmermann, Daniel Herding, and Christine Bescherer (4.2.8) hints are made accessible to students, but only when they actively demand them and not before they have started working on the task. The source of this pattern is the design narrative 'A Learning Tool for Mathematical Proofs with On-Demand Hints' (4.1.7) in which on-demand hints were used to support the learning of mathematical proofs.

CONCLUSION

The classification system derived from the work of Black and Wiliam is an effective way of classifying the patterns related to assessment. As in the project 'Scoping a vision for formative e-assessment' we see a lack of patterns related to determining 'where the learner is going: clarifying and sharing learning intentions and criteria for success', clearly an area in which patterns need to be developed.

We have now accumulated through this collection and the previous collections described earlier a sufficient pool of patterns related to assessment to form the basis for the development of a pattern language that can begin to refine these existing patterns and to systematise them.

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4.1.1 DESIGN NARRATIVE: WEB ENGINEERING

SUMMARY

In a course on web engineering, students were offered the possibility of substituting project work in teams for a written examination at the end of the course. The project results were assessed using a mix of self evaluation, peer evaluation and instructor evaluation.

SITUATION

This design narrative describes experiences in an undergraduate course on web engineering with about 350 students at the Faculty of Computer Science, University of Vienna. Web engineering is a subject that inherently calls for a hands-on approach to the construction of systems; however the curriculum required that part of the course be held as a series of lectures. In this particular case, the curriculum prescribed two hours of lectures and two hours in the computer lab per week. For the lab component of the course, students were split up into groups of twenty, and each of these groups had one dedicated instructor.

TASK

The problem with the situation was that assessment for lecture courses typically includes a written examination at the end of the course. So the lecturer would have to assess more than 350 scripts at the end of course. The following basic ideas provided the foundation of our course:

– Lecturing addresses only the intellect of students, while we wanted to have a more holistic learning approach. Learning is more enjoyable and lasting when it not only addresses one's intellect, but also addresses skills and competences (Rogers, 1983). The challenge was to implement such an approach with more than 350 students.
– We wanted to address different areas of learning: the practical area, the cooperation area, the communication area, the professional area and the relationship area.

ACTIONS

Instead of sitting a conventional written examination at the end of the lecture course, students were offered the option to engage in the *Web Engineering Learning License*

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 245–249.

(WELL) project. Teams of two to five students had to elaborate contributions in a self chosen problem area. For each team, the proposed problem area was recorded in a learning contract, which was signed by the team and the instructor. Different types of contributions were possible: written reports, prototypes of web-applications (e.g. web-shops, interactive homepages, and tutorials), exam question catalogues (for web-engineering courses) and solutions, presentation slides (of their own lecture in theory), etc. WELL teams were coached by their lab course instructor, who approved the contract proposals and conducted the work-in-progress and final inspections.

Blended evaluation was employed to provide a more extensive and multifaceted mode of feedback, assessment and grading. The procedure was implemented as follows:

- Peer evaluation: Each student taking part in the WELL project had to peer review at least three team contributions other than his or her own. For this purpose students uploaded their contribution onto our e-learning platform so as to make it available to be read by others. Optionally, each contribution which was reviewed could be assigned 0 to 5 bonus points. Each peer evaluation was recorded on the e-learning system, where students had to fill in and submit a web form for each evaluation.
- Instructor evaluation: In a final session students presented their contribution to the instructor, and the instructor would ask detailed questions regarding the subject area agreed upon in the contract. In addition, students were expected to have a thorough understanding of the overall web engineering subject matter (i.e. lecture notes), however, without going into the detail that would be required in a written exam. This mode seemed to offer a fair compromise between complete freedom and ensuring basic understanding of the core subject matter.
- Self evaluation: Each team had to submit a written self evaluation of their work with a suggestion of grades for each team member. The self evaluations were only visible to the instructors, and were considered in determining a final grade.

In the end, there was one self evaluation, one instructor evaluation, and multiple peer evaluations available for each team project. Based on these evaluations the lab instructor was able to make an informed decision on the final grade for each team and student.

In the WELL experiment, the problem of addressing different areas of learning was achieved by the following actions (see Figure 1):

- in the practical area: developing a project
- in the cooperation area: working in teams and building together a knowledge base
- in the communication area: using online communication and support in the social relationship
- in the professional area: getting involved in Blended Evaluation.

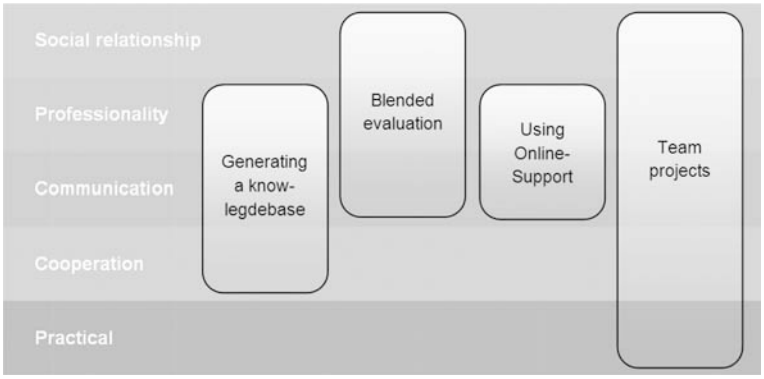

Figure 1. Areas of learning in web-engineering.

RESULTS

What happened?

- Over 80% of the participants chose to engage in the WELL option instead of taking a written examination at the end of the lecture course.
- Handing the coaching of WELL teams over to lab instructors distributed the instructional and organizational workload among several people; thus it remained a manageable procedure, even with a large number of students.
- Having multiple perspectives during the evaluation phase of WELL projects provided (a) useful input for grading, (b) written feedback from peers and instructor to the WELL teams, and (c) a fair and transparent evaluation procedure.

Student feedback showed that they appreciated the 'managed freedom' in the WELL setting:

- One student wrote: 'First of all I'd like to mention that WELL is a great idea. Often it is the case that one hears and learns the material in a lecture, but does not really understand it, because one doesn't have the time to go into all topics of the lecture. Nevertheless, I have some suggestion regarding the proceeding of WELL. Comparing the individual contributions one sees that they differ strongly. It might be wise to prescribe some format and rules, such as minimal and maximal page number, base structure of the contents, structure and expected number of citations, layout, etc.'
- Another student mentioned: 'In this course you see that it is possible to give free space for students, even if the requirements are of a precise nature. Of course, the WELL contracts contributed to having more contact to the students (but also caused more work).'
- Yet a third one commented: 'From the personal point of view it was a very positive course with a good atmosphere and working climate. Technically, I would have

wished more support during the realization of the project. I find the idea with WELL cool, because I can avoid the stress during the last weeks of June, if one does the time management more wisely than we did. Many thanks.'

– 53% of the students perceived reading the peer evaluations as 'meaningful' or 'very meaningful' (See Figure 2).

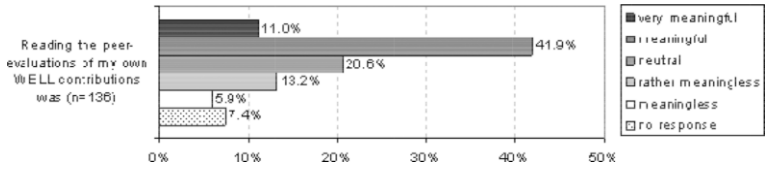

Figure 2. Perceived meaningfulness concerning 'reading peer evaluations'.

LESSONS LEARNED

We learned that blended evaluation, i.e. a mix of self evaluation, peer evaluation and instructor evaluation, is feasible in large classrooms and makes the evaluation and grading process more transparent, enjoyable and participative for all involved. Further, one of the instructors learned how wide the area of web engineering actually is and how much knowledge there is that was not known by the instructor in this depth before.

The students were allowed to chose their contributions from a broad variety (written reports, prototypes of web-applications, exam question catalogues, presentation of their own lecture in the field of web-engineering). This fact made it impossible to compare and grade the different contributions with a fixed set of criteria. Nevertheless lecturer grading seemed to lead to fair and comprehensible results. However, since feedback comes from different persons, there might be conflicting sets of feedback for the student – making sense of it was left to the students. We expect that any guidance will be very effective, but in this course we unfortunately had no further resources for such activities.

The self evaluation component acknowledges the learner-centred view that the learner himself or herself is best able to assess what they have learned. The peer evaluation component enables learners to get a detailed view of the outcomes produced by some of their peers and thus provides a more open learning space where peer contributions are not hidden from learners. The traditional instructor evaluation component finally ensures that the students learned relevant subject matter and contributed to their team's work. In blended evaluation the instructor has the duty of synthesizing the multiple evaluation perspectives into a final, formal assessment and grade. The process can also be supported by a variety of tools. An interesting approach to doing this is the WebPA-tool (Loddington et al., 2009) which allows the customization of evaluation criteria and calculates a grade from multiple scores generated by self assessment, peer assessment, and lecturer/tutor assessment.

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4.1.2 DESIGN NARRATIVE: ADDING A TWIST TO THE MULTIPLE CHOICE TEST

SUMMARY

A multiple choice test is constructed so that it contains a fifty-fifty ratio of correct to incorrect answers, *unevenly* distributed. Choosing correct answers gives positive points, choosing incorrect answers gives negative points. The aim is to simplify test construction and avoid guessing by the student.

SITUATION

If one wants to apply continuous assessment in order to give students feedback on how they are currently doing in a course (as advocated by Entwistle as described in Ramsden, 1992, p. 193) this brings with it a couple of issues. Firstly, increasing the number of items to be assessed increases assessment time. Secondly, preparing more than one type of test or task also takes extra time.

In the course 'Graphical Interfaces' – a master's level course with around 60 students – this problem was addressed in two ways. Among other things, the course featured two elements that were assessed: a theoretical test assessing fundamental parts of the theory, sufficiently important that students should know them by heart; and a practical task where students had to show that they could apply the theory. The theory test was given prior to the practical task, so that students who were weak or failed would realize that they needed a better comprehension of theory in order to apply it in the practical task.

TASK

Since the final practical task would take a lot of time to construct, supervise, assess and grade, the theoretical test had to be very easy to construct and easy to assess and grade but still accurate. Since the aim was to test knowledge that needs to be known by heart, rather than comprehension or any deeper reflections, and since the class was fairly large, a Multiple Choice Question (MCQ) format was chosen for the test format. One of the advantages with such a test is that it can be graded very quickly. However, though constructing such a test may seem easy at first glance, there are some possible pitfalls and issues related to test construction – see for instance Haladyna (2004), Osterlind (1997), McDonald (2002) or, for a quick overview, see

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 251–254.

the section on MCQs on the web site of the UK Centre for Legal Education at the Higher Education Academy (http://www.ukcle.ac.uk/resources/trns/mcqs/one.html). One of the major issues is creating plausible incorrect answers – distractors. Another is constructing questions and alternatives in such a way that test-wise students cannot easily spot the correct answer. Guessing as a strategy is an inherent risk in the normal form of MCQs, although it can be countered by awarding negative points for incorrect answers (this is done in the SAT Reasoning Test, a standardized test for college admissions in the United States) and this decreases guessing but does not remove it entirely. Another strategy to discourage guessing is to provide many alternative answers to each question, but this means that a substantial number of incorrect yet plausible answers – distractors – need to be created. Unfortunately '*good distractors are hard to write*' (Mc Donald, 2002, p. 95). Haladyna & Downing (1993) carried out a survey and concluded that in most cases test items typically had only one or two 'working' – i.e. plausible – distractors, even if the total number of distractors was higher. Their conclusion was thus that three-option questions are optimal.

ACTIONS

The test created had three features. Firstly, there was a penalty for choosing incorrect answers. Secondly, there were only as many distractors as there were correct answers, to lessen the burden of writing good distractors. Thirdly, the correct answers were unevenly distributed throughout the test. Thus, for each question all, several or none of the proposed answers might be correct.

Prior to the course, a list of some fifty questions were formulated, going through the course literature looking not only for good questions but also noting possible correct answers as well as good distractors. The list of questions was handed out to the students on the first day of the course to show them what they really had to know. They were told that ten of the questions would occur in the test to be given four weeks later.

In the particular test used, there were ten questions with three answers each, and thus there were fifteen correct answers and fifteen distractors. Since they were unevenly distributed each question could have zero, one, two or three correct answers. This eliminated many standard guessing techniques like 'if two answers are opposite, one is correct', and 'this one is correct so the other two must be wrong' (advice offered on the web site 'Study Guides and Strategies' http://www.studygs.net/tsttak3.htm).

In order to make sure that the students would really understand how the test worked, they got a short introduction in class. One of the example questions was as follows:

Q. What did Walt Disney do?

– *He founded Walt Disney Productions together with his brother Roy.*
– *He took classes at the Chicago Art Institute, and got a Bachelor of Arts at Yale.*
– *He died of lung cancer in 1966, at the age of 65.*

Here, answers a and c are entirely correct whereas b is only half true; Disney never studied at Yale. The example clearly shows that an answer needs to be entirely correct, indicating that just because one part seems familiar, it doesn't mean that the answer is fully true. This form of question makes it easier to create distractors that are not obviously wrong. Another thing explained in this introduction was that choosing an incorrect answer would result in negative points, so it might be better to refrain from choosing an answer if unsure. The students could select any number of answers altogether, they were not required to select exactly fifteen answers.

RESULTS

This type of test has been run four times. At all times, students have been given two hours to complete it, but most of them finish within the first hour and no one has stayed the full two hours. When discussing the test, students say that they find it slightly intimidating to lose points over an incorrect answer. Many claimed to have been prevented from guessing, but on the other hand, others said that they had deliberately set out to find all fifteen correct answers and had stumbled somewhat in doing so.

Most students appreciated the fact that they had been given the range of possible questions at the start of the course. They had also been encouraged to cooperate: '*I don't care how you learn the answers as long as you do learn them.*' In the first year one energetic person engaged the entire class of 58 students, distributing questions so that each question was answered by three or four students. The answers were compiled into a 40-page summary that most students used for studying. From a learning perspective this did not matter; students learned what they had to learn from the literature.

Looking back at the two initial issues – reducing guessing and reducing construction time – the redesign of the test worked well. Increasing the ratio of correct answers to 50% would in itself have promoted guessing, but as a consequence of the combination of the penalty (reducing the average gain of a guess) and the uneven distribution (obscuring the odds that a certain answer was correct) guessing was decreased.

As for reducing construction time, looking for distractors when formulating the entire list of questions saved plenty of time later, and it also made it easier to construct resit examinations and next year's test. However the great gain in time was due firstly to the fact that the 50/50 ratio of correct answers vs. distractors lessened the burden of writing good distractors and secondly, that the uneven distribution allowed some slack when constructing the test – if it was easier to write correct answers rather than distractors to a certain question, that question could have several correct answers, and vice versa.

LESSONS LEARNED

A lot of balancing can be done with this kind of test to adapt it to the current class. The parameters are the numbers of alternatives to each question, the ratio between

correct and incorrect answers and if, and by how much, an incorrect answer should be penalized. Note however that when the ratio of correct answers increases, penalties or an adjustment of the grading scale will become necessary.

Anyhow the main ideas – to combine a 50/50 ratio of correct to incorrect answers with a penalty for wrong answers and an uneven distribution of answers – did simplify test construction and reduced guessing, meaning that it in that sense is 'better' than the ordinary multiple choice test.

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4.1.3 DESIGN NARRATIVE: ASSESSMENT OF GEOGRAPHICAL SKILLS USING INTERACTIVE MAPS IN AN E-QUESTIONNAIRE

SUMMARY

This design narrative describes the use of QTI-Google Maps e-questionnaires to assess geography-related skills. The class was a group of 14-16 years-old students in the secondary school Duc de Montblanc in Rubí, Catalonia (Spain). The teacher of Geography and History was used to using a range of materials to teach geography: text book, paper-based maps and on some special occasion he used a data projector to show digital resources such as Google Earth, but assessments were always in the form of paper and pencil examinations with blank maps.

TASK

The teacher wanted to use a web map application (WMA) for assessment purposes because it has enriched geographical data. The blank maps that he normally used in his exams do not enable the assessment of important IT geographical skills included in the educational curriculum. Moreover, when he included blank maps in the paper and pencil tests he had a lot of work to do in designing the test and manually assessing the answers.

The teacher wanted to evaluate the knowledge of his students but also their spatial skills using a map, something which cannot be performed satisfactorily using blank maps. He knew that WMAs have functionalities such as: zoom, selection of different types of maps, and addition of geolocated elements. The teacher wanted his students to learn how to use these functionalities for developing important skills in the Geography area and, therefore, he needed to be able to assess whether they had acquired these skills. For instance, the teacher might want to assess whether students could locate on a map the exact position of the city of Barcelona, or whether they could draw the best route between their school and the main train station of the town, or whether they could find the highest mountain of each of the six continents.

The problems associated with this task were: (1) to find a method of assessing geographical skills using a web map; (2) the solution had to be simple enough to perform an assessment activity with a big group of students and (3) the teacher

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 255–261.

had to assess the students' interactions and the outcomes obtained as a result of the interaction with the web maps.

ACTIONS

Computer Assisted Assessment (CAA) solutions provide innovative and powerful modes of assessment that enable teachers to use new questions for assessing a wider range of student's skills (Conole & Warburton, 2005).

In the present case, the teacher was interested in assessing the students using a WMA, so a tool was developed that enabled the creation of an e-questionnaire with interactive web maps.

The tool was created following the educational technology standard for assessment, the Question & Test Interoperability standard (QTI, 2006). The WMA selected was Google Maps (Google Maps, 2010) because it allowed free access to the code of the software. The web maps were used with the objective of creating enriched questions in the field of Geography. Figure 1 shows a screenshot of the editor (http://sourceforge.net/projects/qtigmaps/) that creates the QTI-Google Maps questions.

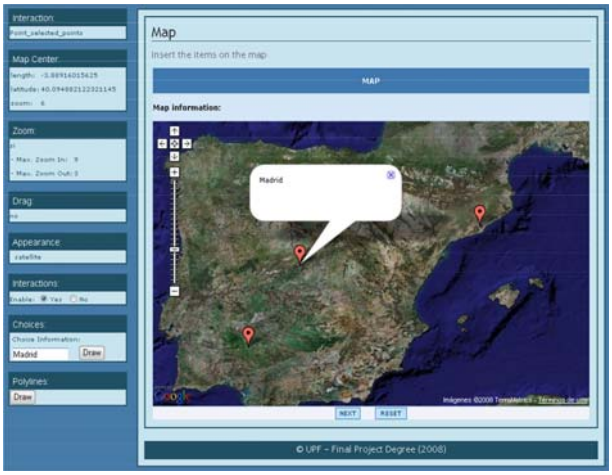

Figure 1. QTI-Google Maps questionnaire editor.

As Figure 1 shows, a teacher can create questions using the QTI-Google Maps editor producing a QTI questionnaire with web map questions. This has to be interpreted by an engine compliant with the QTI standard. Middleware was implemented to mediate the communication between the QTI engine and Google Maps, this middleware manages all the information related with the web map questions. The students can visualize and interact with the questions using the geographical functionalities and information provided by Google Maps.

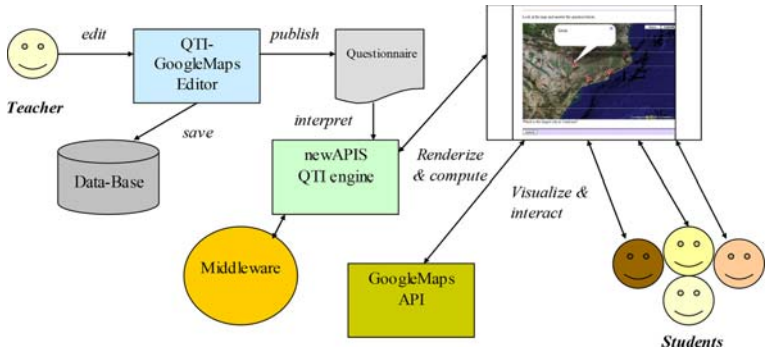

Figure 1. Creation, publication, visualization and interaction of the QTI-Google Maps questionnaire.

The teacher prepared a test, using the editor, which contained eight questions related to topics from the course. The experiment was performed in a laboratory of the secondary high school Duc de Montblanc, with the teacher of Geography and History and his group of students. The laboratory classroom had 12 computers and internet connection. The software (the QTI-Google Maps software) was installed on the computers of the laboratory.

On the day of the activity, three researchers helped in the organization of the examination and checked the computers. The teacher arrived before the students, and reviewed the e-questionnaire. The teacher was not sure whether his students were used to managing Google Maps, though he thought that they had used web-sites such as the 'Guía Michelin' to search for specific places.

The students began to arrive at class and they tried to switch on the computers, but they were asked to sit in the chairs in the centre of the laboratory. It was the first time that they had used computers to do a test. They were very excited and nervous, because they knew that this was a real exam, although it was a new way of doing an exam. One student said *'I'm going to fail'.*

The teacher decided that the students should carry out the exam in pairs because it was a novel experience for them, though one student did the exam alone because he got the worst marks in previous exams and because the number of students was not even. Mixed gender groups were chosen, and 'rebellious' students were not put together.

When all the students had arrived, the teacher introduced the activity to the students. Then one of the researchers did a brief introduction to the main characteristics of the QTI-Google Maps tests using the projector (see Figure 2). She used an example of a test which had all the different interactions that a user could use. The students were excited, talking with each other, and expressing some doubts, and questions: *'Can I delete the question if I make a mistake?', 'What happens if I draw the line far away from the 'real' frontier?'* These doubts and comments demonstrated the understanding that the students had about the functionalities of

Google Maps or similar WMAs. The doubts were clarified and the introduction was finalized.

Figure 2. Introduction of the QTI-Google Maps questionnaires.

The 23 students were divided in two subgroups because of the number of computers in the room. The first subgroup of students answered the questions. The three researchers and the teachers stayed in the laboratory helping the students (see Figure 3).

Figure 3. A group of students during the exam using the e-questionnaire tool with interactive maps from Google Maps.

The other group was waiting in another classroom. When the first group had finished, the second group came to the laboratory and the first group went to the other classroom. The second group then answered the questionnaire (see Figure 4).

Figure 4. Students using the e-questionnaire tool with web maps from Google Maps.

RESULTS

A range of data gathering techniques were used to collect information about the experience. The teacher was interviewed by the main researcher, and the students carried out pre and post-tests (before and after interacting with the QTI-Google Maps tests). The three researchers made observations during the study.

Once the activity was over the students were very happy because they liked answering the questions by interacting with multimedia maps. All of them interacted with the questions without problems and they obtained good results. They said that in interacting with this type of maps they understood better the concepts in the questions, and they also said that answering this e-questionnaire was a fun experience.

Surprisingly (considering the comments of the teacher) most of them had used Google Maps significantly often before. At the beginning the students were apprehensive about the content of the examination, but not about using a new application, as one student said ‘computers do not scare us’, an affirmation that was supported by the comments and faces of her classmates.

The teacher was happy because the experiment was successful and he did not have to mark the students’ work, because the system did this automatically. Also the test (or individual questions) could be reused in the future because it follows the QTI standard.

LESSONS LEARNED

WMAs are useful as a way to increase the interaction affordances of an e-questionnaire. The combination of a WMA with an educational technology standard for assessment (QTI) enables the creation of new question items thus increasing the possibilities of assessing more students' skills (Boyle, 2009). Based on the analysis of the data captured during the study we came to the following conclusions.

The students (in general) are very familiar with the functionalities offered by WMAs (in this case Google Maps). The use of these types of tests enhances the motivation of the students in assessment because the questions offer a large quantity of information, the information is updated, and they have to play an active role (interacting with the web map) to answer the questions.

The use of the QTI-Google Maps solution for assessment has a number of useful features: 1) it uses all the information provided by Google Maps and so students can visualize (and teachers can use) a lot of web maps that they do not have in their books; 2) the information in Google Maps, and in WMAs generally, is updated and increases almost every day; 3) students can interact with (and teachers can edit) web maps and questions, drawing over the map, dragging and dropping elements, zoom in on an area, etc.

The students detected some usability problems. They wanted to have the possibility to erase the interactions marked on the map in order to re-answer the questions. Also we detected that it would be useful to add a clear explanation in the context of the questions indicating how the students should interact with the map (for instance, to draw over the map the student had to click in the map using the mouse).

Due to the limited technical skills of the teacher, a researcher helped the teacher in the editing of the QTI-Google Maps test. A future plan includes evaluating the usability of the QTI-Google Maps editor in order to improve the tool and adapt it for non-technical users.

After carrying out this study, we suggest that teachers should use web map applications (WMA) to support their lectures more generally and not only in the assessment of geographical skills.

This design narrative has been created to obtain preliminary conclusions that illustrate that the QTI-Google Maps solution it is useful for the assessment of geographical skills. However more evaluation is necessary to demonstrate the educational benefits of the QTI-Google Maps tests.

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4.1.4 DESIGN NARRATIVE: OPEN MENTOR

SUMMARY

Open Mentor is a tool to support tutors in the feedback process and addresses the following problem: that a balanced combination of socio-emotive and cognitive support is required in the feedback from teaching staff and the feedback needs to be relevant to the assigned grade. Open Mentor analyses and displays the different types of comments provided by the tutor as feedback to the students, and it then provides reflective comments to the tutor about their use of feedback. This work followed a pedagogically-driven development process, beginning by developing scenarios of use, then storyboards, and then putting in place an implementation which would follow closely the pattern of these storyboards. Open Mentor was not designed for use at institutional level, but to give teaching staff a tool that can be used in training and also later as personal support that will enable individual tutors to track their use of feedback to students. This work was developed in conjunction with Stuart Watt at Robert Gordon University as part of Open Mentor a JISC funded project (see: http://kn.open.ac.uk/public/workspace.cfm?wpid=4126).

SITUATION

Open Mentor was built to assist tutors at the Open University and Robert Gordon University to provide constructive feedback to students in order to help them improve their work but also to give socio-emotive feedback as well, because praise is particularly important to distance learning students who do not have full knowledge of their peer's progress. Tutors need to be reminded that the mark does not speak for itself, and that other feedback is needed. The precursor to Open Mentor was e-Mentor which was internally funded by the OU and which provided a proof of concept system. This system stripped out all the tutor's comments made on an assignment and classified them according to Bales' categorisation (see details of Bales in Task Section). The important finding here was that the system worked for any type of assignment, whether it be Mathematics, Science, from the Arts Faculty or from Education.

Open Mentor was designed to give feedback to the users in a graphical form. The system was intended for tutors to use, not only at the Open University, but in any establishment and it can be customised to suit any Higher Education marking system (whether using grades or numbers etc.) The system has been used with students'

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 263–268.

essays that have been assessed at the Open University, Robert Gordon University and Manchester Metropolitan.

Open Mentor incorporated an interface where any assignment could be submitted to the system providing it is in a web format. The advantage here is that the course does not have to be delivered via the web. I believe the use of Open Mentor is particularly timely as most Higher Education Institutions are now asking their students to deliver their assignments electronically.

TASK

One of the problems with tutor feedback to students is that a balanced combination of socio-emotive and cognitive support is required from the teaching staff and the feedback needs to be relevant to the assigned grade. This project set out to capitalise on technology to build a training system for tutors in Higher Education that would support them with their feedback to students and which in turn would encourage their students to become more reflective learners.

Feedback is, put simply, additional tutoring that is tailored to the learner's current needs. In the simplest case, this means that there is a mismatch between the students' and the tutors' conceptual models and the feedback is reducing or correcting this mismatch, very much as feedback is used in cybernetic systems. This is not an accident, for the cybernetic analogy was based on Pask's (1976) work, which has been a strong influence on practice in this area (e.g. Laurillard, 2002).

Since feedback is very much at the cutting edge of personal learning, we wanted to see how we could work with tutors to improve the quality of their feedback. To this end we have built Open Mentor which is an open source tool which tutors can use to analyse, visualise and compare their use of feedback.

Open Mentor was designed to provide tutors in Higher Education with a tool that would assist them with assessing the support and guidance (i.e. the written comments) that they were giving to students on their assignments with respect to the mark awarded for that assignment.

The feedback to tutors would be in a graphical form illustrating the distribution of the comments they had provided to the students into the four major Bales' categories. This analysis would be compared to an ideal set of comments which would be given to a student for the particular mark awarded (see screen dump in Figure 2).

The rationale for providing this type of feedback to tutors in order to support them in providing feedback to their students is given below. The important point to stress here is that tutors know their subjects and are competent at awarding grades and we did not want them to feel threatened in this respect. However, we wanted to help them provide more constructive feedback to help the students to improve in their future assignments. We wanted students to start to understand what they did not know and to enter into a dialogue with their tutors.

Students need a balanced combination of socio-emotive and cognitive support in their feedback from teaching staff, and the feedback needs to be relevant to the

assigned grade. In order to provide feedback Open Mentor has to analyse the tutor comments. The classification system used in Open Mentor is based on that of Bales (1970). Bales' system was originally devised to study social interaction, especially in collaborating teams; its strength is that it brings out the socio-emotive aspects of dialogue as well as the domain level. In previous work (Whitelock et al., 2004) we found that the distribution of comments within these categories correlates very closely with the grade assigned. Bales' model provides four main categories of interaction: positive reactions, negative reactions, questions, and answers. These interactional categories illustrate the balance of socio-emotional comments that support the student. We found (Whitelock et al., 2004) that tutors use different types of questions in different ways, both to stimulate reflection, and to point out, in a supportive way, that there are problems with parts of an essay. These results showed that about half of Bales' interaction categories strongly correlated with grade of assessment in different ways, while others were rarely used in feedback to learners. This evidence of systematic connections between different types of tutor comments and level of attainment in assessment was the platform for the current work. The advantage of the Bales model is that the classes used are domain-independent – we used this model to classify feedback in a range of different academic disciplines, and it has proven successful in all of them. An automatic classification system, therefore, can be used in all fields, without needing a new set of example comments and training for each different discipline. A second point is that Bales draws out a wider context: we found that as we started to write tools that supported feedback, we began to question the notion of feedback itself. Instead, the concept seemed to divide naturally into two different aspects: learning support and learning guidance. Support encourages and motivates the learners; guidance shows them ways of dealing with particular problems.

ACTIONS

The first step was to identify and understand the stakeholders' needs. In order to build the first storyboards for Open Mentor and to ensure the software would meet the needs of both tutors and students, we devised two questionnaires, one for tutors and the other for students. Forty-four tutors from King's College London, Manchester Metropolitan, the Open University and Robert Gordon University completed the tutor questionnaire while 47 students from the Open University and Robert Gordon University responded to a questionnaire which was designed to understand how students reacted to tutor feedback. Both tutors and students agreed that comments should reflect the grade awarded, which is a basic premise of the Open Mentor system.

We then set about designing the system architecture. The resulting Open Mentor architecture is based on the following main components:

– a data source for course information and lists of students and tutors
– a data source for use within Open Mentor to store assignments, submissions and classified comments

– a classifier which can categorise tutor comments
– an extractor which can read tutor comments from word processed files
– an evaluation scheme description which defines the classes of comments, the grading bands and the expected benchmarks
– a logic component which applies the evaluation scheme to the data to be classified.
– See Figure 1 below for a diagram of the system architecture.

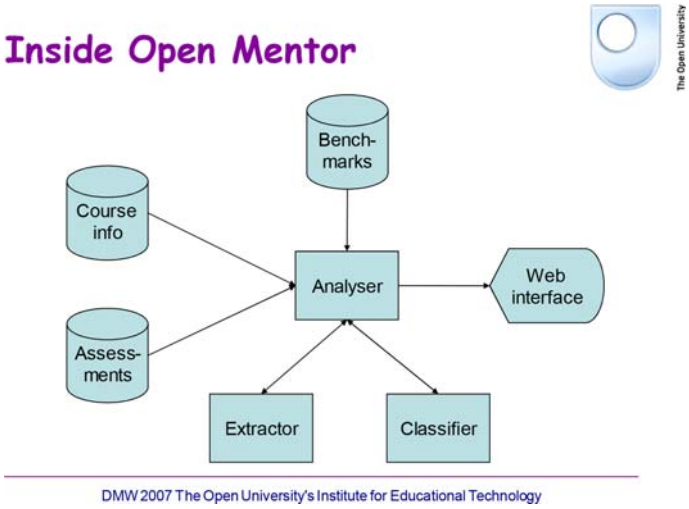

Figure 1. System architecture for OpenMentor.

RESULTS

Open Mentor is implemented using Java, and runs as a web application, enabling people to use it in any location. The open source movement influenced the direction of the project; initially we had used open source software as a kind of library of components that we could re-use. Later, particularly when we moved to Spring (http://www.springsource.org/), we found our system became much smaller, as we could plug our developments more easily into larger frameworks. We also moved to a point where we could contribute to the development of open source software: our developments of the Apache POI-based code for extracting text from Word files exceeded the capabilities of the standard distribution.

Open Mentor has been used with training sessions for tutors. The biggest surprise the tutors encountered was that they needed to use more praise in their comments to students. Many believed that the mark spoke for itself, and so they neglected the reassurance that students need, as they do not necessarily know how their mark relates to the rest of their group's progress.

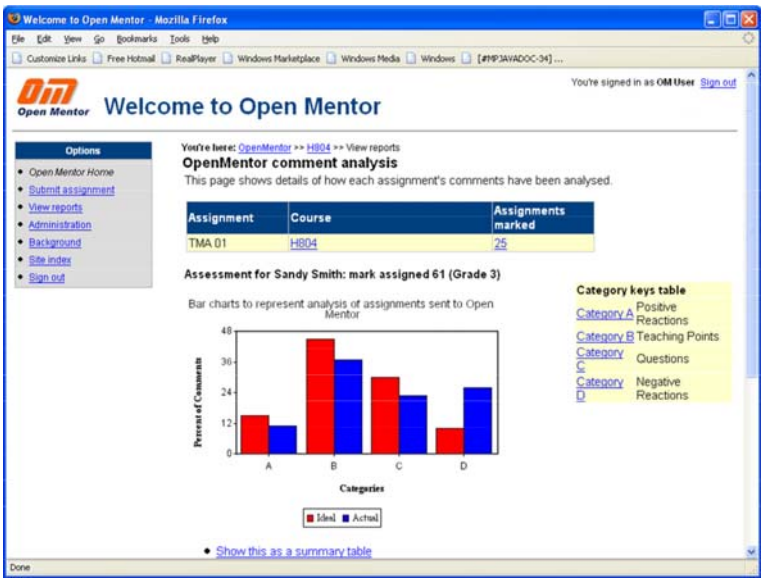

Figure 2. Screen dump of Open Mentor revealing feedback to a tutor.

LESSONS LEARNED

The advantage of the Bales' model is that the classes used are domain-independent – we used this model to classify feedback in a range of different academic disciplines, and it has proven successful in all of them. An automatic classification system, therefore, can be used in all fields, without needing a new set of example comments and training for each different discipline.

A second point is that Bales draws out a wider context: we found that as we started to write tools that supported feedback, we began to question the notion of feedback itself. Instead, the concept seemed to divide naturally into two different aspects: learning support and learning guidance. Support encourages and motivates the learner; guidance shows them ways of dealing with particular problems.

Open Mentor has proved to be an important training tool for tutors to reflect upon the sort of feedback that they give their students especially with respect to the mark awarded.

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4.1.5 DESIGN NARRATIVE: A TUTOR'S JOURNEY

SUMMARY

This design narrative is a reflective narrative used to demonstrate a tutor's trajectory in creating student centred learning opportunities and to showcase the associated impact. The story provides support for the pattern by giving an account of the development of a tutor's skills in providing feedback to high achieving students through interaction with his students and a mentor. It draws on evidence from an Open University course and describes the challenges in giving feedback and providing evidence of the students using the feedback to impact on future learning (closing the loop). Consequently, it is an account of both the students' and the tutor's learning.

SITUATION

This was an Open University, predominantly online, distance learning course, 'Networked living: exploring information and communication technologies', where knowledge and understanding of information and communication technologies was the core of the associated curriculum. The group consisted of 16 students whose backgrounds were diverse, in terms of age and aptitudes. This dictated an adaptive approach to address student needs. Students submitted their assignments online for the tutors to collect and mark. A significant aspect of the course was the assessment process, consisting of a robust model of periodic assessment, where students submitted assignments online to a university server. The tutor's duty was to download and mark the assignments and projects. Tutor feedback activities consisted of completing a generic form and annotating the assignments before submitting them back to the system. A monitoring process was in place to ensure that this particular aspect of the feedback process was completed (see Appendix). In addition, a computer conferencing tool, FirstClass, was used in the course, and there were opportunities for the tutor to use this channel to provide feedback to individuals or to the group.

In this context, the tutor is central in the feedback and assessment process. Though course content encourages some peer review by embedding peer review activities that require online collaboration, these are limited. Since this is a university entry course, it is assumed that the students need 'strong' tutorial guidance rather than focussing on developing independent learning competences at this stage. However,

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 269–273.

there is an underlying pedagogical framework that has certainly strengths, namely to develop an appreciation of technologies, including learning technologies: computer conferencing, e-assessment tools, and in some cases, social software and social networking.

TASK

A general problem for me was to ensure that the closing the loop process took place even for students who performed well, and to enhance the quality of feedback in order to also address the needs of those students that performed well.

ACTIONS

Engaging in reflective practice was a priority to help me improve my feedback. Collegiality was a characteristic element in the assessment framework. Monitoring of assessments identified certain areas for my development. The monitor would contact the tutor to introduce himself/herself and discuss his/her recommendations. This worked well as conventional power relationships and hegemonies were undermined from the beginning and the tutors had the opportunity to engage in dialogue during the monitoring process.

In response to the monitor's comments, a number of questions helped me to engage with my assessment duties in a reflective manner:

- Do I provide good feedback?
- What do students make of my feedback?
- Does the 'closing the loop' component of the assessment process take place?
- Do students who get high marks benefit from my feedback? Do they need my feedback at all, since they manage to get most of the marks?
- Do I have to justify the loss of every individual mark in the distinction bracket? Why?
- Is it necessary or completely redundant to be specific about missing marks? E.g. does it matter how they lost between 1 and 15 marks, if they received an overall mark of between 85 and 99?

The electronic submission worked well in this course. The role of technology was to facilitate the submission and to support easy access to the assignments (pre and post submission) and potentially to make the feedback provision process pain-free and transparent enough. However, this flexibility and ease of access did not address other significant issues, namely:

- the provision of appropriate feedback to all students regardless of their performance in an assessment task
- closing the loop, by ensuring the students took comments into account in subsequent assessments

– keeping a balance in the power relationship between tutor and students, as the process made the tutor the absolute adjudicator of student performance with the student not having much of a say in the process.

I encouraged students to comment on the feedback they received and to give an account of their responses to the feedback. I included, where possible, further comments on the students scripts concerning marks gained and lost.

Table 1. Criteria in monitoring form (The Open University)

Acknowledges good work
Uses a friendly/personal tone
Provides encouragement and support
Provides a summary of strengths and weaknesses
Suggests ways of improving future work
Course specific criteria
Comments positively on good points
Corrects and explains errors or omissions
Identifies and explains irrelevant material
Makes clear and constructive comments
Directs student to course materials and/or other relevant materials
Clearly explains where marks were gained or lost
Identifies excessive or insufficient length
Comments on communication skills
Course specific criteria

EXAMPLES OF COMMENTS ON FEEDBACK

Monitor 1

As you probably know, my aim as a monitor is not to check every little mark you give, but to ensure that your marking is consistent with the marking guide and that guidance is given to the student where appropriate. I may occasionally make the comment that I would have done things differently, but please remember that this is only my opinion and not some hard and fast rule.

Looking at these three assignments, I found myself a little unsure about the way you approached them, so I'll apologise now if I've missed anything in the way of embedded comments or misinterpreted your feedback. I say that because there seems to be quite a variation between them. I felt your marking was fine, but that the quantity and quality of the feedback varied considerably. For example, you hardly

said anything to X – either on the feedback form or on the script. I counted a total of 57 words of feedback, and even for someone who'd done as well as he has, I feel that's a bit low. He would probably like to know what he'd have to do to get the remaining marks and **some praise for specific good points** that he's made would help to encourage him and reward him for the work he's put in.

Conversely, I felt that you handled Y much better and more sympathetically. There's considerably more feedback and encouragement there, and if the other two had the same level of commenting I'd be much happier. However there's time to work with him on that, and I appreciate that there's a lot for everyone to take in with the very first assignment in the first presentation of a new course.

I felt that Z fell between the two – both in terms of marks and in your feedback, and that made me wonder **if you find it hard to find enough to say to stronger students**. It's a problem I have from time to time, and I have tried to overcome it by commenting on specific things that I really like.

Regards, A

Monitor 2

Dear Stylianos

I agree with your marking and comments.

But I think you could develop your practice to provide a marks breakdown on the student's script to show more explicitly where marks were gained and lost on the student's script.

And for more feedforward potential I think it could have been appropriate to include further/more comprehensive skills comments on the script/feedback form, and suggestions for future assignments.

I think your comments are supportive and informative. But the breakdown above suggests that it could include a more comprehensive summary of strengths and weaknesses, and further suggestions for ways of improving future work.

Regards, B

Comments from Staff Tutor

Hi

I think B has made some useful suggestions above. Students really do appreciate being able to see clearly where they have lost marks.

RESULTS

The use of a prescriptive mark sheet allowed me to increase the range of marks I awarded, breaking my usual 70s barrier. Sometimes it was difficult to justify the loss of marks, as I am predisposed not to award marks beyond a certain threshold. For instance it was hard to explain what happened to the missing 28 marks, when

the overall mark was 72 and a distinction. As far as the students were concerned, it was difficult to monitor how feedback was taken into account from assignment to assignment even though the university had established as part of this learning process reflective activities on 'learn how to learn' that were integrated in the assessment process. I also felt the need to highlight in my feedback how excellent performance could be replicated across the different assignments in the course periodic assessment, and how people could benefit from interaction with each other in the context of computer mediated communication.

LESSONS LEARNED

I was fortunate for two consecutive years to have high-achieving groups and I assumed I did not to have to write copious comments in my feedback to encourage them to improve. I realised that the weakness of this assumption was that my students did not have the opportunity to transfer good performance to other contexts and situations.

Revisiting often the learning outcomes of both of the course and the assignments made me think about multi- and cross-disciplinary skills that students have to develop. I could finally appreciate the electronic submission not just for the flexibility it offered but for the opportunities it gave to the tutors and the students to engage in dialogue.

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4.1.6 DESIGN NARRATIVE: READING ACADEMIC PAPERS

SUMMARY

Beginning teachers were enabled to develop strategies for reading academic papers through an interactive process supported by a wiki, word-processing and data projector. This process generated ideas from students' own varied experiences and enabled them to reflect on their own strategies and skills and whether they needed to develop or improve them.

SITUATION

Beginning teachers were embarking on a one year postgraduate course to become teachers of information and communications technologies (ICT) or computing in secondary schools. Their course contained Masters-level elements that required academic reading and writing in this social science context. These beginning ICT teachers comprised a group of 23 students from varying backgrounds. Most had limited experience of reading research papers in social science as their degrees were quite technically based. Many were from minority ethnic groups and English was not their first language. Most had limited experience of academic writing, therefore writing 8,000 word assignments was a significant and potentially daunting challenge. This is, however, only one of the challenges in an intensive programme where much of their time is spent in school placements where students learn practical elements of teaching.

TASK

The aim was to enable beginning teachers to develop strategies for reading academic papers. This forms part of a structured programme to develop their ability to carry out action research and write assignments on a range of educational issues.

ACTIONS

Students were set the task of discussing in pairs for about 10 minutes the question 'How do you go about reading an academic paper?' They wrote on paper their lists of ideas of what to do when reading an academic paper. During that time the tutor

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 275–278.

walked around and listened to the talk to ensure that they were engaging with the task and to assess their general level of understanding.

Next, a set of ideas was built up on a wiki by one of the students using a Tablet-PC linked to a data projector so that the developing list could be seen on the screen by the whole group. Each pair contributed an item in turn. As each item was added other members of the group commented on its appropriateness, value and position in the developing list. Elements of the list were moved around in the wiki page to create an order as agreed by the group (See Figure 1). Agreement was checked by raising hands at intervals. For some contentious ideas alternatives were included and the need for flexibility owing to individual preferences was discussed. For example, some students reported finding skim reading especially difficult and preferred to read parts of the paper carefully to understand its scope and focus. While some students preferred to keep electronic notes, others preferred paper.

Students then worked in pairs to read a paper. The paper was Kay, R. (2007) The role of errors in learning computer software, *Computers & Education* 49, 441-459, and it was chosen because it addressed an important area in learning ICT and it also discussed errors in using computer software which was something that most students had encountered in their previous studies of human computer interaction. The paper made limited reference to learning theories but did refer to mental models. Thus this paper was starting to bridge the gap between the students' previous technically-based studies and their current focus on learning and teaching, where much of the reading material was discursive in nature as it addressed theoretical concepts from areas of social science.

Is it relevant? Check: title; abstract / summary; keywords
Is the source reliable?
Identify key ideas: skim read or use keywords; table of contents; conclusion.
Is it research-based? Does it provide new evidence?
What does the literature review cover?
Main themes?
Author's purpose?
Read in a suitable environment that enables concentration

Figure 1. Guidelines for reading an academic paper when writing an assignment.

Read the paper individually and then in pairs discuss these **questions:**
What are the main findings of the research presented in the paper?
What other findings or ideas are referred to that are relevant to teaching and learning ICT?
How reliable and generalisable are the findings?
What are the implications for teaching and learning ICT?

Figure 2. Task: Reading an academic paper.

Students followed the guidelines agreed previously (see Figure 1). They highlighted important elements and annotated the paper and guidelines electronically with salient comments in relation to a specific task (see Figure 2). This activity took approximately 30 minutes.

There followed a whole group discussion of about 20 minutes where one group showed their annotations and others commented. Finally, in a 10 minute plenary, students were asked to think for three minutes in silence about what they had learned during the session and some were then invited to share their thoughts with the whole group.

RESULTS

A master strategy for reading an academic paper, with variations, was developed as a list (see Figure 1) that could be referred back to. Students started practising and thinking about how to apply this. Adjustments were made throughout. Unexpectedly, one student alerted the tutor that her partner had not understood the task as he had thought we were talking about reading exam papers, therefore a brief whole group question and answer was held about the range and nature of academic papers. The paired discussion then proceeded without adjustment. The whole class discussion was a process of continuous adjustment where students suggested different approaches and various ideas were pursued. The developing list was continually changed to reflect the consensus of the group. This was an introductory session for this topic. In addition to enabling students to think about developing their approach to reading an academic paper it was important for the tutor to identify the students' range of understanding and expertise. Listening to their discussions while the groups worked was important for this purpose and comments in the final plenary were also useful.

The next task, to be done individually after the session, was a short writing task based on an analysis of a paper. This was diagnostically assessed by a writing support tutor who designed one or more support and feedback sessions for those identified as needing additional support. Further whole group activities referred to the strategy and built on recommendations from the writing support tutor.

LESSONS LEARNED

The electronic facilities provided:

- a visual display of the consensus from the discussion as it developed (wiki and data projector)
- a means for a pair of students to jointly read and annotate a document (word-processor)
- an aid for students in displaying and explaining their findings to the group (wiki and data projector)
- a record that individuals could refer to later (wiki).

The main advantages of using a wiki rather than just a word processor were that 1) the wiki, being web-based, was accessible to all students for viewing and editing and 2) the wiki page created in this session became part of the wiki-based resources available to students. These resources were developed predominantly by students, both on this year's course and in previous years. In developing these resources students had worked alone, in small groups, or in whole class sessions managed by a tutor. The 'e' in e-assessment in this formative context aided communication and presentation. The formative nature of the activities derived from the responses of the lecturer and other students. These were mediated predominantly through face to face conversations, but the technology enabled recording of ideas as they developed, and therefore supported communication among the group. Thus, continual relatively small adjustments drove the activity and the lecturer's developing understanding of the students' knowledge, capabilities and needs fed into future planning. The hope was that individual students were also making adjustments in their thinking.

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4.1.7 DESIGN NARRATIVE: STRING COMPARISON IN LANGUAGE LEARNING

SUMMARY

This design narrative is an account of an experiment in computer-aided language learning, in which an enhanced form of string comparison was used for error detection. Crucial to the approach was the robustness of the feedback under all circumstances and levels of student proficiency, as well as the opportunity for users to react to the feedback by resubmitting improved versions of their answers. This experiment was carried out as part of a non-funded project run at the University of Kent.

SITUATION

This design narrative describes a trial which focused on the need for modern foreign language students to practise a written (foreign) language independently in a context where they could receive feedback on their errors, enabling them to improve their language skills. Prior to the initial trial, students would complete regular hand-written sentence-translation exercises which were tutor-marked. The trial involved a technology-based alternative to these hand-written submissions, which it was hoped would benefit students and staff alike.

To date there have been three different sets of trials using this approach. The first took place at a UK University (Fowler, 2006) involving undergraduates on an ab initio Spanish 'wild-card' module[1]. The students involved in this study were not enrolled on modern language degrees but nevertheless the wildcard module counted toward their final classification. The second and third sets of trials took place in UK Grammar schools; in one school the system was used for GCSE[2] and A-level[3] French courses and in the other for an A-level Spanish course. These trials are ongoing at the time of writing.

TASK

The university module for which this experiment was devised was an intensive one, with heavy emphasis on acquiring a sound knowledge of the structure of the language. Students required no previous knowledge of Spanish to enrol for the course but were expected to acquire a level of fluency somewhere between GCSE

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 279–284.

and A-level within two terms. (In other words akin to the level a student at a UK secondary school would achieve after about three years of study).

In the year that the system was first trialled, weekly or fortnightly exercises (each consisting of between 20 and 30 phrase translations) were being set to a cohort in excess of 90 students. This gave rise to a huge volume of marking, making it exceedingly time-consuming for tutors to provide detailed individual feedback. The course leader was keen to find a computer-based solution to alleviate the load, but was unable to find reliable software for dealing with 'whole-phrase input' style questions. This type of question provides a richer pedagogical experience for students than multiple-choice and fill-the-gap style grammar exercises, but they are difficult to mark automatically in a robust way (marking systems for this question type are often useless when user input is particularly poor).

ACTIONS

To fulfil the Spanish department's need for a tool which could be used to automatically assess and give instantaneous feedback on whole-phrase input questions a bespoke system was designed at the University. The system consisted of three parts:

– an exercise/question-delivery engine
– an automatic marking engine based on enhanced sequence comparison
– a tutors' interface.

Students using the system answer randomly-generated, translation-based questions, grouped into exercises which focus on specific areas of grammar. The sequence comparator marks up errors in input using colour coding and font style to highlight the different types of mistake, which can fall into five generic categories:

– incorrect items (bold, red font)
– misspelt or mis-conjugated items (incorrect characters in bold, magenta font)
– omitted items (brown square brackets)
– redundant items (green font in angle brackets)
– incorrectly positioned items (italic, blue font).

If a student's answer contains errors, he or she is given a second attempt, in which to correct the submission based on the feedback received. If the second attempt is also incorrect, further feedback is given, along with the model answer(s). An example feedback screen is shown in Figure 1.

In addition to the student interface, a tutor interface allows staff to look at students' performance at varying levels of detail (at the cohort level, the exercise level and the individual level) and to perform moderation of marks if necessary.

Rather than using parsing for error detection the system uses an enhanced form of sequence comparison. Sequence comparison involves comparing strings (i.e. sequences of characters) to detect the similarities and dissimilarities between them. It is a method which is frequently used in areas such as molecular biology and

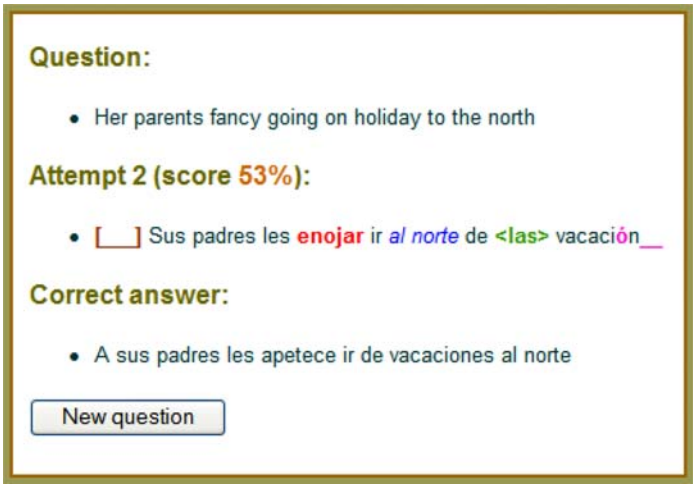

Figure 1. Example feedback screen.

speech recognition to compare continuous data sequences. It had not previously been successfully applied to error detection in language learning due to the complexity of the combination of errors that can arise – not least the possible transposition of items in the incorrect sequence. (Traditional sequence comparison algorithms can only accurately detect substitutions, insertions and deletions in an altered sequence). For a fuller explanation of this field of research see Sankoff and Kruskal (1999).

Comparison-based systems have certain limitations – they cannot function if model answers are not available and they cannot differentiate grammatically between different error types. But they can accurately detect and differentiate between the five generic error types listed previously, and this method has two distinct advantages over the parser-based method. Parser-based systems are unable to give detailed feedback on answers which feature a high percentage of unanticipated errors – whereas a system such as the one in question, based on enhanced sequence comparison, will provide detailed feedback even if the answer under consideration is highly confused or inaccurate. Furthermore, the sequence comparator described in the design narrative is entirely language-independent, and therefore the CALL software which utilises it can be used to present exercises in a great many languages. A parser based system would obviously only be suitable for the language the parser was designed to process.

The idea of allowing resubmission of initially faulty answers arose out of a need to determine whether or not the generic style of feedback was clear to users (i.e. would students be able to improve their answers without any specific grammatical information about the errors they had made). Being able to compare first and second attempt scores made it possible for tutors to gauge the efficacy of the method. However, it quickly became apparent that the possibility of correcting and resubmitting answers was extremely popular with students and had the distinct

pedagogical advantage of making them focus on their errors (and think carefully about how to rectify them) in a way that simply did not occur when tutor marking was used and feedback was provided one or two weeks after submission. The process helped students avoid making the same mistakes repeatedly and improvements over the course of an exercise were clearly demonstrable.

Figure 2 shows how the mark for a single question within an exercise is awarded, given that a user may get the question right immediately, or require a second attempt.

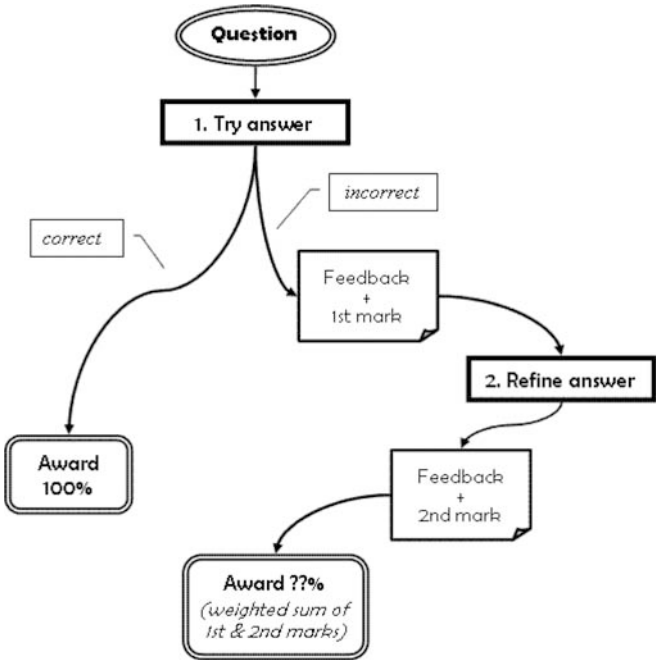

Figure 2. Flowchart showing how the mark for a question is calculated.

RESULTS

Prior to the introduction of the new software, students had to translate batches of sentences into Spanish, and would receive their marked work back one to two weeks later. If grammar points had been misunderstood students were likely to repeat their errors throughout the exercise, contributing to their misconceptions becoming 'fossilised'. Furthermore, given the time lag, there was no guarantee that students would look at feedback properly once their corrected work was returned. With the introduction of the new system, staff no longer had to spend hours each week marking the grammar exercises and students no longer had a long wait for feedback.

Analysis of the answer data (thousands of attempts over a number of years) shows that the system works well. For evaluation purposes all student files for every

exercise submitted at the University were divided into a number of separate sections and the answers given in each of the sections were examined. This process revealed that, despite the lack of grammatical information in the feedback, in nearly all cases there are marked improvements between students' first and second answer attempts, and more importantly, that there is measurable improvement in both accuracy and speed of answering as users progress through exercises.

It should be noted that the questions are generated randomly and students can do each exercise in a single sitting or in multiple sittings over the course of several weeks – thus it is not the case that improvements are attributable to question-ordering or the effects of short-term memory. Furthermore sentence-types can be fairly complex, and students have to attempt to get all aspects of a sentence correct, so it is not simply a matter of concentrating on a single grammatical aspect such as verb endings.

The initial University trials were run on a voluntary basis in the first year of use, however, the system proved so popular with students (the level of use exceeded all expectations and students even requested additional exercises) that the following year it was made a compulsory part of the Spanish module, with the marks awarded being used in the exam boards. Tutors were obviously happy with the reduction in marking load and the students undoubtedly found the system useful, as evidenced by the voluntary extra effort they put in. For compulsory exercises there are a minimum and maximum number of questions to be attempted. Students can stop after completing the minimum number of questions, but can carry on (up to the maximum number) if they wish. Over the course of the university trials (which involved thousands of processed answers), students attempted on average 50% more questions than they were required to do.

Two school trials followed, one at a boys Grammar in Kent, the other at a mixed Grammar in Cambridgeshire. The Kent school offered their 6th form students the same Spanish exercises as the University, with access to the system being entirely voluntary. As at the University, student uptake was good and the course leader was pleased with the learning that took place. The school in Cambridgeshire developed bespoke exercises in French to use with the software, for both GSCE and A-level students. Exercises were offered both in a classroom-based context, and on a voluntary basis for self-study. Some students put in a surprising amount of time with the system.

LESSONS LEARNED

It was apparent that students enjoyed and benefitted from this more testing type of exercise and put far more effort into using the system than had been expected. The idea of allowing resubmission of incorrect answers, which began purely as a way of testing the efficacy of the feedback style, soon proved to be one of the most successful aspects of the software. We also learnt that students are quite capable of error correction without specific grammatical explanation – in most cases it is enough to simply indicate the location and generic type of the error and students will be able to put it right. From the teacher's point of view, an unexpected further benefit was that course teams were able to separate successful from unsuccessful

exercises. That is to say scrutiny of cohort performance enabled them to differentiate exercises which were challenging but successful from those which engendered little improvement in the student cohort, despite the fact that average marks might have been low in both cases. Furthermore, this was possible without resorting to pre and post testing, due to the detailed analysis that can be performed on the student results files, coupled with the random nature of the question presentation.

There is considerable potential to develop this approach. Given the language-independent nature of the error-checking modules, the system can be used as a vehicle to provide exercises in many European (and other) languages, without needing to make any modifications to the error-diagnosing routines. Source material for exercises (questions) can be tailored to any course the system is used to support and can be presented in a variety of formats (the system's feedback engine works not only for translation but for any exercise-type where there is a definitive set of acceptable answers – for example dictation, rewording, reading comprehension, or vocabulary testing). In addition to university-based, GSCE and A-level language courses, this system could easily form part of any number of self-study or distance learning courses.

NOTES

[1] A wild card module is one which is taken purely for interest and is not usually directly related to a student's degree subject.

[2] The General Certificate of Secondary Education (GCSE) is an academic qualification awarded in a specific subject. Students aged 14–16 in secondary education in the United Kingdom usually take GCSEs in a number of subjects.

[3] The Advanced Level General Certificate of Education (A-level) is an academic qualification awarded in a specific subject.taken at part of the education system in the United Kingdom. A-levels (in a in a in a specific subject. A levels in a number of subjects are generally taken as a direct continuation of the secondary education process over two years from ages 16 to 18. A-levels are the standard entry qualification required by UK universities.

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4.1.8 DESIGN NARRATIVE: A LEARNING TOOL FOR MATHEMATICAL PROOFS WITH ON-DEMAND HINTS

SUMMARY

We describe an application which supports students in doing mathematical proofs by deductive reasoning. When they make a mistake or get stuck during the solution process, they can get a hint that gets them back onto the right track. This work was developed as part of the SAiL-M project, which was funded by the German Federal Ministry of Education and Research (BMBF) from 10/2008 to 02/2012.

SITUATION

Proving mathematical theorems is an important part of the curriculum in introductory mathematics courses at university. For example, lectures about elementary geometry are usually held in combination with tutorials in which students are asked to prove statements such as Thales' theorem. In traditional learning scenarios with formative assessment, students hand in their solutions each week and later receive feedback and a score from a tutor.

Unfortunately, students are often unable to accomplish their assignments correctly. When they are at a loss, they have to hand in incomplete solutions. Some might even try to plagiarise their fellow students' work. A small clue might be enough to get them back onto the right track, but tutors usually do not have the time to assist each individual student during the learning process, and instead they only evaluate the results. This is especially the case in large introductory courses with hundreds of participants.

TASK

Our goal was to support students' learning processes by offering software that provides feedback and hints on demand. It should enable students to check the correctness of their intermediate results, and to obtain small hints when they are stuck. This would not only reduce frustration among the students, but also remove much of the burden of correction work from the tutors, so that they could concentrate on the students who require additional help.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 285–291.

Our review of related work showed that there is a lack of systems that can assist students in proving mathematical theorems during exercises. Euclid Avenue (Lukoff, 2004) allows the student to create propositional calculus proofs which are evaluated automatically, but that only happens after the solution has been submitted. Lukoff reports that most solutions handed in by the students were either fully correct or worthy of no credit at all, i.e. completely wrong or incomplete (Lukoff 2004., p. 43). Our hypothesis is that students in such situations would perform better if they had the chance to receive feedback during their solution processes.

EASy (Gruttman et al., 2008) is a system that evaluates the solution while the student is working on it. But, although it features sophisticated mechanisms to verify the mathematical correctness of the student's steps, its feedback capabilities are very limited. It immediately tells the student about mistakes, but is unable to give hints on what to do instead.

ACTIONS

Proving a mathematical theorem is a creative task, and there are usually many possible solutions. In our experience, there are a few typical solution approaches for each proof assignment, and most students who succeed in constructing a proof follow one of these. But even when two students use the same approach, their solutions can vary, if only in terms of different notation styles and formulations. These inconsistencies make it hard to automatically analyse students' solutions. To overcome this problem, we chose a formal notation of writing down proofs.

The two-column proof (Herbst, 1999; Holland, 1988) is a format that is especially wide-spread in North America. As its name suggests, the proof is written down in a table with two columns. In each row, the left column contains a proposition, such as 'The triangle ABC is isosceles'. The right column holds the reasons why the proposition on the left is true. The reasons are references either to propositions further above in the proof, or to general theorems whose validity may be presumed. The first rows of the proof usually hold given propositions. While the usefulness of the two-column format is disputed (cf. Usiskin, 1980, p. 73 et seq.), it emphasises an important principle of deductive reasoning, namely that each proposition must be justified using definitions, propositions, or theorems whose validity has been proven earlier. This is a very important part of learning how to develop proofs. Once they understand this principle, students can switch to semi-formal mathematical notation or to informal texts. Besides this necessity of giving all the reasons why a statement is true, the standardised format makes evaluation easier for tutors as well as for computers.

Silver (2009) suggests letting students put together pieces of paper in order to build two-column proofs. We developed an application called ColProof-M (see Figure 1) in which the user can work in a similar way, using drag and drop to place proof steps, and using drop-down lists to select reasons. Theorems that may be used can be looked up in a virtual book. Using the Cinderella Dynamic Geometry System (Müller et al., 2006), we also included an interactive, dynamic illustration that helps

the user to understand the propositions of geometry proofs. Parts of the illustration are highlighted when the user clicks on a proposition.

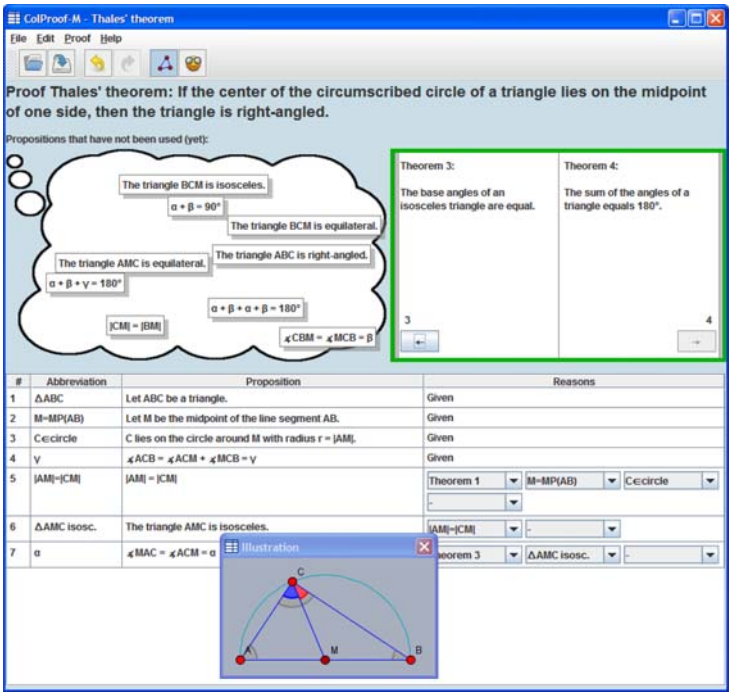

Figure 1. The ColProof-M main window and illustration dialog. The user can request feedback at any time by clicking on the smiley button in the toolbar.

Whenever the user wants to receive feedback on his/her current progress, he/she can use a feature to check his/her intermediate solution (see Figure 2). ColProof-M will then run a series of test steps that check for different types of errors. These test steps can be separated into two categories. Some steps evaluate the general structure of the solution. For example, by analysing the graph representation of the proof (cf. Holland 1988, p. 37), the application can detect circular dependencies in the reasoning. Other test steps check the factual mathematical correctness of the proof. For instance, ColProof-M may give the feedback that a wrong reason has been selected in a certain row of the proof. ColProof-M is only a prototypical application and therefore does not include an automatic theorem prover. Instead, the factual correctness is evaluated by comparing the student's solution with a sample solution that has been created earlier by a teacher. For this reason, a ColProof-M exercise is an objective test (cf. Bull & McKenna 2004, p. 19 et seq.), as the set of correct solutions is predetermined.

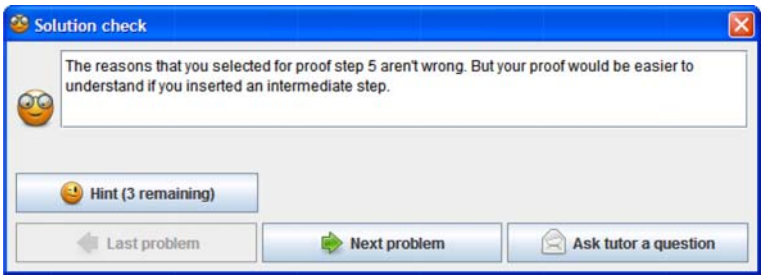

Figure 2. The feedback dialog of ColProof-M, reporting a problem. The user can take a hint for this problem, but the number of available hints in the exercise is limited.

Sometimes the information that something is wrong simply is not enough to help the student. For example, one test step might report that the proof has not been completed yet. This information alone would be of little value for a student who is stuck, as all he/she could do is add random steps to his/her proof until the error message disappears. Such a trial-and-error approach can be tedious and frustrating, and we decided to save the students that trouble.

Therefore, we implemented a feature that offers the student a hint for certain problems. The hint is integrated into the feedback dialog, and can be read after clicking on a button (see Figure 3). Still, we want our students to think first before they use hints. This is why it is possible for teachers to limit the number of hints per exercise according to the complexity of the problem. When the proof is finished, the feedback feature approves the solution and reports the number of hints that the user had to take to fulfil that task. There is an extra compliment when no hints were required. These acknowledgements are supposed to motivate students to take as few hints as possible in further exercises.

To make our feedback feature reusable, we made it available as a Java framework named Feedback-M. This framework has since been used in other e-learning applications, such as the set algebra tool SetSails! (Herding et al., 2010).

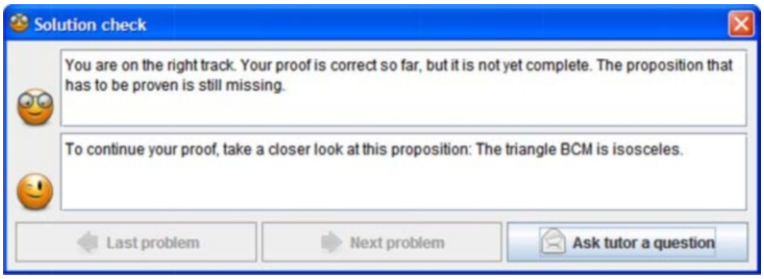

Figure 3. The feedback dialog, showing a hint.

RESULTS

During the summer semester of 2010, we asked the students of the 'Einführung in die Geometrie' ('Introduction to Geometry') course at the University of Education in Ludwigsburg to do four proofs using two-column notation (Herding, 2013). For example, they were asked to show that the perpendicular bisectors of a triangle intersect, or to prove Thales' theorem. In all four assignments, the choice of utility was up to the students. They could either use ColProof-M, or simply write down their proofs on paper. They could also use any other technology that they considered useful for the assignment, such as Dynamic Geometry Software. Offering such a choice is suggested by the TECHNOLOGY ON DEMAND pattern (Bescherer & Spannagel, 2009).

We invited students to solve the exercises in the computer room, where ColProof-M was installed on all PCs. We used the capture and replay tool Jacareto (Müller et al., 2006; Bescherer et al., 2012) to record the users' interaction with the software. Tutors were instructed not to give any feedback during the solution process as we wanted to evaluate the acceptance of the automatic feedback and hint features. Unfortunately we were unable to acquire recordings during one week due to technical problems. Overall, we analysed 22 solution processes of students working in groups of two or three. On average, each group read 5.5 distinct feedback messages and took 1.2 hints. Ten of the processes (45%) ended with a successful solution, and seven of those successful groups used the feedback feature more often than the average number of 5.5.

Only one group was unable to solve the exercise despite taking all three available hints. This number suggests that limiting the number of available hints does not lead to widespread failure. However, it is astonishing that 11 groups gave up even though they would have been able to take at least one more hint. Four groups did not even use the feedback and hint features at all. It is possible that they were not aware of the existence of these features, and that they did not notice the toolbar button to open the feedback dialog.

At the end of the semester, we conducted a short survey, in which 53 students took part. Fifty-five per cent of them stated that they had used ColProof-M for at least one exercise. The survey included free text questions about the advantages and disadvantages of the tool. The students were of two minds about the fact that the proofs were predetermined. On the one hand, six people were critical, saying that they couldn't derive the required proof from the sample solution. On the other hand, eight people liked the fact that all required propositions were given.

Five students stated that they appreciated the hint feature, and one person mentioned the possibility of checking one's solution. Two students argued that ColProof-M had enabled them to work independently. Interestingly, another participant claimed that the software had offered him no support in finding an answer to the question. This student may have been part of a group which was unable to find the feedback and hint features. Three people complained about the lack of documentation or tutorials.

This criticism is justifiable, as we hadn't finished writing the ColProof-M manual at that time.

LESSONS LEARNED

We think that implementing the ColProof-M application was worth the effort, as it supports the students in their solution processes and relieves the tutors of their correction work. The feedback and hint features allow the students to work independently. However, the feedback-on-demand and hint-on-demand principles can only work when all learners are aware that assessment and support are available at any time. Hence, an easy-to-use graphical interface and good documentation are essential.

As described above, the ColProof-M exercises described in this contribution are objective tests. While this makes computer-assisted assessment possible, it may constrain students who come up with alternative approaches, for example they may not be able to implement their solutions because the available propositions and theorems are insufficient. Therefore we added a feature which allows students to add new, or modify existing, propositions. While ColProof-M can still evaluate the structural integrity of such a customized proof, it is no longer able to give feedback or hints on their factual correctness. For this reason, a semi-automatic form of assessment (Herding, 2013) is required in which feedback and hints on customized propositions are given by human tutors.

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4.2.1 PATTERN: BLENDED EVALUATION

SUMMARY

Blended evaluation is employed to consider a mix of self evaluation, peer evaluation and instructor evaluation in the assessment phases of a course. While the process is more demanding for all involved, it caters for increased student involvement and transparency of the evaluation and grading process.

PROBLEM

Assigning grades to student contributions is the classic way of doing assessment in courses, but the benefit for students and the quality of information conveyed are typically low. An alternative – or complement – to classical grading is to provide feedback, which offers more meaningful and useful information than a simple grade or score. Still, that information is usually provided by one single person, i.e. the instructor. An approach to widen the horizon of perspectives is *blended evaluation*, which includes learners, instructors and peers as sources of feedback.

CONTEXT

Blended evaluation is applicable in any educational context in which instructors are willing to consider multiple perspectives in assessment, and where learners are capable of providing constructive feedback and a critical view on their own contributions. Blended evaluation means a combination of different evaluation types and it is also *blended* in the sense of 'blended learning' (as Wallace, 2009 defines blended learning) – namely a combination of face-to-face (f2f) interaction and e-learning. In this context it is important that f2f-interactions and e-learning-elements are not simply put together in a course, but that f2f-interactions and e-learning-elements are aligned and that they stand in a relationship of mutual exchange. Online tools help to reduce the effort of collecting assignments and delivering feedback in all evaluation tasks, particularly in the peer-evaluation component.

SOLUTION

Blended evaluation combines the views of different persons, whereas in contrast blended assessment combines different assessment methods (e.g. multiple choice

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 293–299.

tests, project works, or presentations). The blended evaluation pattern is composed of the following processes:

– self evaluation
– peer evaluation, and
– instructor evaluation.

Instead of traditional grading, learners receive feedback in the form of *blended evaluation*. Blended evaluation means a combination of self evaluation, peer evaluation and instructor evaluation, which is used to provide more detailed and multifaceted feedback than grading. Note that blended evaluation is used to evaluate one set of student contributions from multiple perspectives, for instance a project is evaluated by the project owner, by peers working on similar projects, and by the instructor. To provide for transparency in the process, evaluations can be made available electronically to participating students.

To achieve a shared understanding we start with a brief summary of a few basic terms. *Evaluation* means the process of giving feedback by tutors, co-students and lecturers to an *evaluee* and rating an *evaluation object.* The *evaluation object* can be any contribution, process, or accomplishment. The person who contributes the object of evaluation is the *evaluee*. The *evaluator* is the one who is doing the evaluation of the object. In the case of *self evaluation* this means that the creator of an evaluation object and the evaluator are the same person. The communication between evaluee and evaluator follows a simple structure (Figure 1).

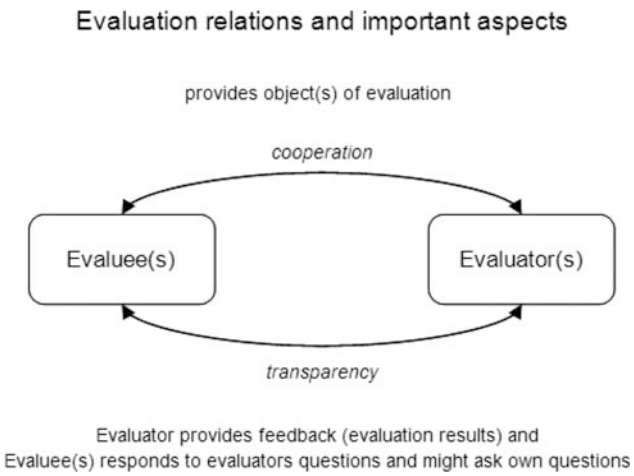

Figure 1. Evaluation relations.

Evaluations can either be unidirectional (and in the case of peer evaluation can be anonymous) or can allow the evaluees to communicate with the evaluators, for asking questions, clarifying or discussing certain aspects of their work.

A typical course

A typical course that used blended evaluation might take place in the following way. The course starts with an initial face-to-face meeting, in which students form teams and either are assigned to tasks or allowed to choose their tasks by themselves. Then the student teams work on their assignment and submit their results onto an e-learning system for peer evaluation. The peer evaluation is performed online by peers from other teams. After the peer evaluation, the various outcomes of the assignments are improved according to the peer feedback. In the next step a presentation of the assignments follows. Each student has to perform a self evaluation of his/her own contribution. The self evaluation provides first-hand reflections and information about the activities and efforts of individual students. Alternatively each team can work collaboratively on their team evaluation. This variant is suggested when the team is allowed to make a direct grade suggestion for each team member. Finally there is an evaluation by the instructor. The grade for the course is assessed by the instructor based on all the evaluations.

Self evaluation

In the classic approach an important perspective on the learning process is often neglected, namely the perspective of the learner himself or herself. Providing an opportunity for a self evaluation accommodates this perspective. In a self evaluation process, students evaluate their achievements and contributions. This can be achieved by requesting either free text evaluations or by the use of structured questionnaires. The flow of activities of self evaluation is depicted in Figure 2.

In the preparation step, the objects to be evaluated and the evaluation criteria are defined. Usually this is done by the instructor, but it is also feasible to involve students in making these decisions. The next important step is to publish the self evaluation criteria and available guidelines, to ensure a transparent and well guided evaluation process, and then the learners perform the self evaluations. In the end the evaluations are provided to the lecturer(s) and/or other participants.

Peer evaluation

In peer evaluation scenarios students receive feedback from their peers, which encourages active participation and engagement of learners in the assessment process. Also students experience the task of peer reviewing and giving constructive feedback. The activities are depicted in Figure 3.

Note that it is possible to either assign learners to particular objects of evaluation or the learners may be allowed to choose freely. In any case it is important to provide for a fair distribution of evaluation objects, and to ensure that every object is evaluated at least once.

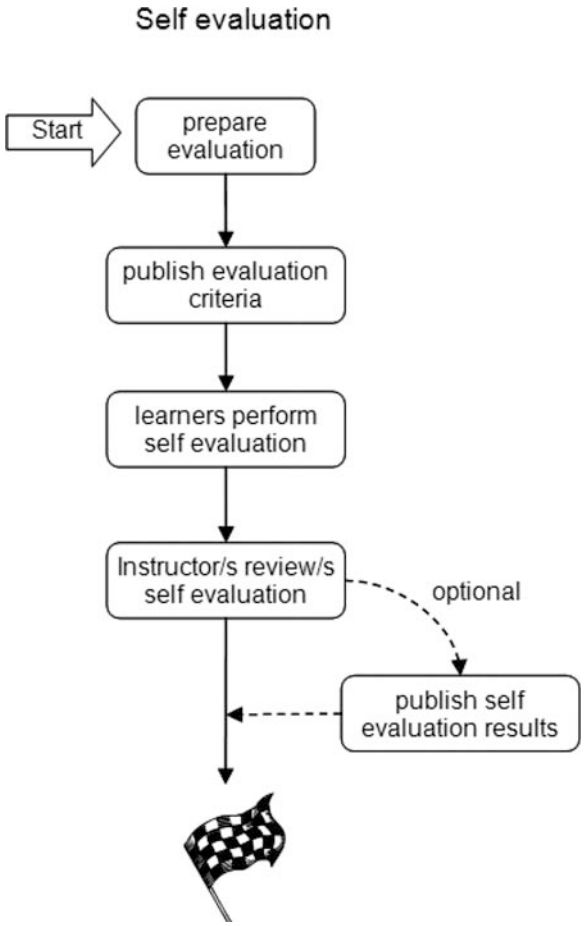

Figure 2. Sequence of activities in self evaluation.

Instructor evaluation

Instructor evaluation aims at providing learners with feedback from the instructor as a complement to grading (Figure 4).

The first step is preparing the evaluation and the evaluation criteria. The publishing of evaluation criteria in the next step contributes to transparency in the process. Then the instructor performs the evaluation and provides the feedback to the learners. This can be done orally or in written form, e.g. via the e-learning system. Publishing the evaluation results is optional but it might be interesting for other learners to see and compare, so this could be discussed with students in the preparation of the evaluation criteria and process.

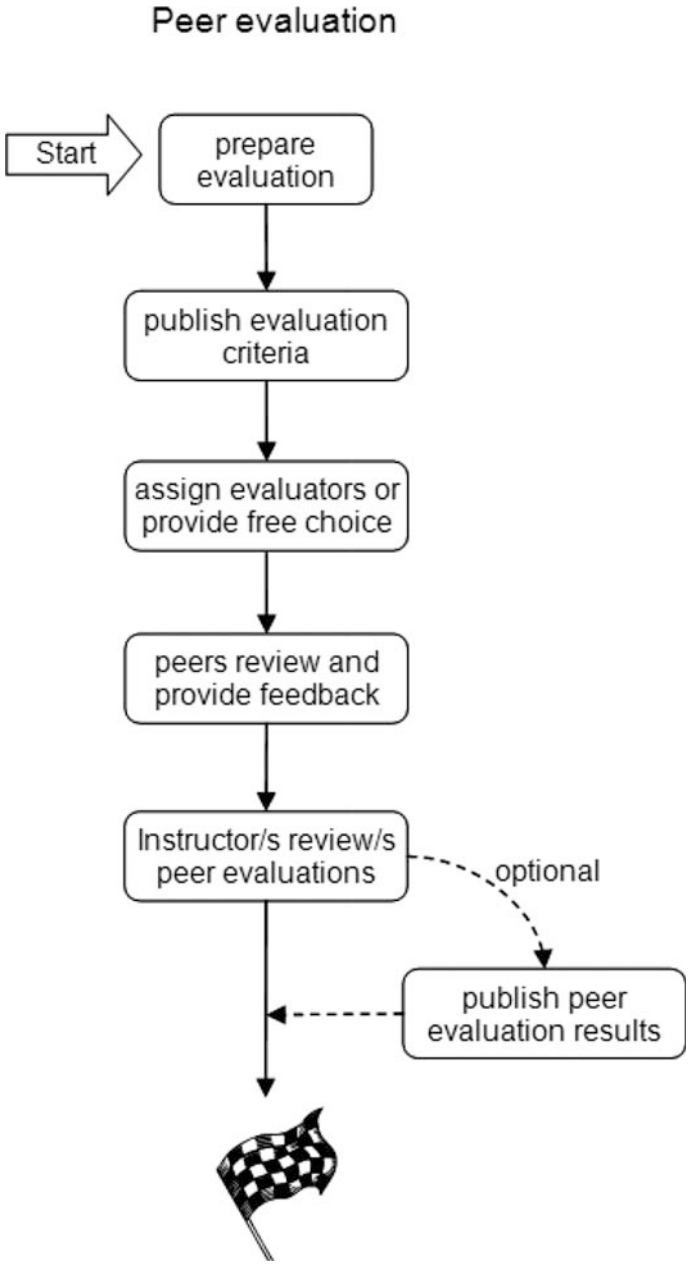

Figure 3. Sequence of activities in peer evaluation.

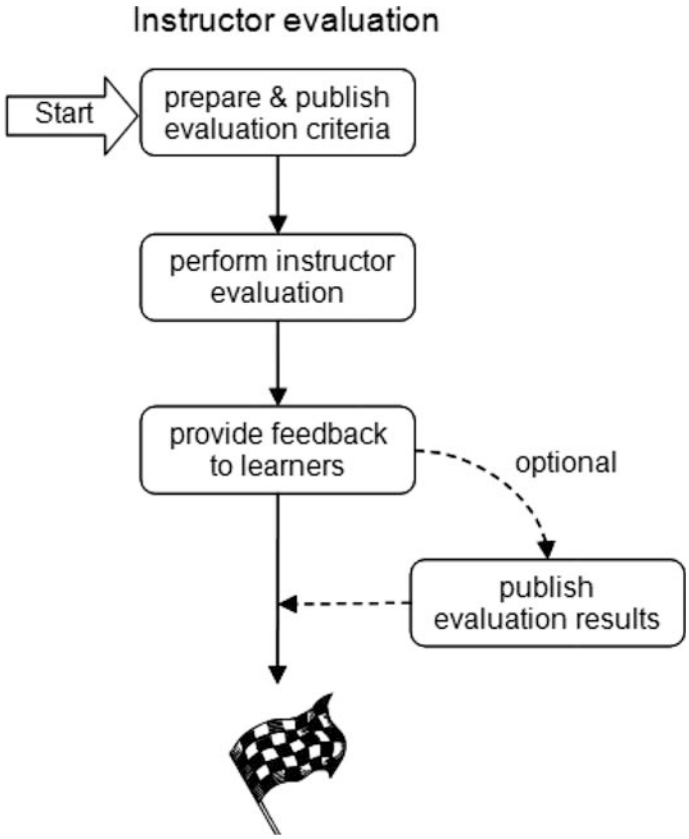

Figure 4. Sequence of patterns for instructor evaluation.

SUPPORT

Source

The source for the pattern BLENDED EVALUATION is the design narrative 'Web Engineering' (4.1.1).

Theoretical justification

Traditional grading lacks information value for the learners and fairness, especially fairness towards learners that are struggling with their studies (Vierlinger, 1998). This process of grading cannot satisfy the standards of reliability, validity and objectivity (Vierlinger, 1999). Objectivity means that a grade is impartial and independent from the person who gives the grade, which in practice is not the case, as different teachers

are found to give different grades for the same work. Reliability is achieved when the same teacher is able to arrive at the same grade at any time, but many teachers (and other evaluators) are not able to reproduce grades in a reliable way. Validity implies that a grade stands for a definable aspect ('the learning') that was measured, but learning is multidimensional (e.g. the personal and overall achievements, the efforts, the development during the process, the unrecognized contributions, the deeper understanding of topics), so valid measurement is virtually impossible.

Blended evaluation attempts to reduce these problematic aspects of grading by taking different perspectives and opinions on achievements and contributions into account, specifically the view of the learner, the view of the learner's peers, and the view of the instructor. Rogers & Freiberg (1994) state that the primary evaluator of learning is the learner, influenced and enriched by the group and a facilitator. In blended evaluation all three aspects are incorporated.

Blended evaluation was designed in the context of learner-centred education, which strives to achieve a particular kind of prizing, acceptance and trust towards students as one major part of providing conditions for significant, beneficial learning (Rogers, 1983, p. 123). Self evaluation, in particular, accentuates and cultivates the responsibility of the learner towards his or her (self-initiated) learning practice (Rogers, 1983, pp. 158-159). Learning is more successful when the interest of the learners rises. This can be fostered by encouraging learners to learn in a self-regulated way (Rogers, 1983; Stern, 2008, p. 21). Blended evaluation contributes to enhancing the learning process, by enhancing the grading process with increased transparency, fairness, and student-inclusiveness.

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4.2.2 PATTERN: CHAOTIC MULTIPLE CHOICE TEST

SUMMARY

In order to reduce guessing in multiple choice question tests and to reduce effort in test construction construct the test so that the ratio of correct answers is comparatively high (e.g. 50%) and distribute correct answers unevenly (that is a question may have zero, one, or more than one correct answer options).

PROBLEM

Constructing Multiple Choice Questions (MCQs) for classroom use has two basic problems:

- Students – especially test-wise ones – may gain extra points by guessing.
- Writing of possible distractors – i.e. incorrect, but yet plausible, alternative answers – is difficult and time consuming (especially if each question is to have as many as four or five alternatives).

FORCES

One cluster of forces is related to guessing and penalties for guessing. If penalties *are not* used, students will gain extra points by guessing, since they have nothing to lose, as pointed out by Scharf and Baldwin (2007). If penalties *are* used, guessing is a matter of calculating the odds (McKeachie, 2002, p. 81). These odds are improved if one or more of the distractors can be spotted, either by knowing the subject – the aim of the test – or by applying meta-analysis skills to the test and how the questions and alternatives are formulated (cf. Biggs, 2003, pp. 180-181). If the test is badly constructed (often due to poor distractors) the latter may well be a suitable strategy that does not require a lot of tiresome studying. If penalties are used, there is a risk that students who are insecure may be too cautious and score less than they ought to since they might refrain from answering some questions in fear of the penalty. Gamblers' results may vary a lot, depending on chance.

Another cluster of forces is related to the time the teacher can and wants to spend on the construction of the particular test. MCQs are easy to assess, a hundred tests can easily be graded in a few hours. However constructing them takes time, especially writing the distractors. Haladyna (2004, p. 69) has concluded that *'Distractors are the most difficult part of the test item to write'* and similarly McDonald (2002, p

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 301–304.

95) states that '*good distractors are hard to write*'. Additionally, it is the quality of the distractors that often determine the quality of the test; if the distractors are non-plausible some of them will be easy to rule out, increasing the odds of guessing the right answer, so there is a link between the two issues of reducing guessing and the time it takes to construct the test.

CONTEXT

If one wants to simplify the task of writing a MCQ test, in turn saving time in constructing it, as well as reduce the risk of students gaining extra points by guessing, CHAOTIC MULTIPLE CHOICE TEST may be suitable. As with any MCQ test it is fast to assess.

SOLUTION

The solution to the above issues builds on three design choices in combination:

– the correct answers are **unevenly distributed** throughout the test, so that each question may have zero, one, more or all answers that are correct
– there is a **penalty** for picking an incorrect answer
– the **ratio** of correct answers is comparatively high, circa 50%.
– Students get points for each correct answer they find, rather than one point per correctly answered question.

By distributing correct answers unevenly, one muddles the odds for the test-wise student. Not knowing whether a certain question has zero, one or more correct answers eliminates a number of guessing strategies such as eliminating two options that say essentially the same thing. Similarly, using penalties reduces guessing. However none of these strategies simplify the construction of the test. Allowing more correct answers does, but it increases the odds when guessing and therefore it should be combined with penalties. If combined with an uneven distribution the effect is twofold; guessing is reduced even further and constructing the test is simplified since the uneven distributions allows some slack – if it is hard to write distractors for a certain question then it may have more correct answers and vice versa.

Preparations

It can be a good idea to go through the material beforehand, trying to write down possible questions, their correct answers and possible distractors. This will indicate how many questions the test should contain, how many alternatives each question should have, and the ratio of correct answers to distractors that may be suitable. Decide upon the following parameters:

– the number of questions

– how many alternative answers each question should have
– the ratio between correct and incorrect answers - note that when the ratio of correct answers increases, so does the need for penalties
– how high the penalty for selecting a distractor should be.

A couple of days before the test students should be introduced to this somewhat unusual approach so that they do not make the mistake of marking one answer per question as in a standard MCQ. Here, it is important to demonstrate what a distractor can be like e.g. it could be one where only half of the statement is true.

Making the test

Then, prepare the test. Randomly distribute the order of correct and incorrect answers, making sure that you get the correct number of each. Do this first. Then, populate the test with questions and correct and incorrect answers in this order. Write instructions regarding the uneven distribution, what the ratio of correct answers is and what the penalty is. Lastly, clarify that students do not have to pick as many alternatives as there are correct answers.

SUPPORT

Source

The source for the pattern CHAOTIC MULTIPLE CHOICE TEST is the design narrative 'Adding a twist to the multiple choice test' (4.1.2).

Theoretical justification

Strictly speaking this test is a form of the Multiple True False (MTF) format since it features several correct and several incorrect answers to each answer albeit evenly distributed as described by Haladyna (2004, pp. 81-84). Haladyna also describes the Alternate Choice format (pp. 75-77) where each question only has two alternatives, one correct and one distractor, stating that one of its advantages is that it is easy to write since one *'...only has to think about a right answer and one plausible distractor*.' (p.76). In both cases Haladyna comments that the 50% chance of guessing the right answers needs to be countered, suggesting an adjusted grading scale. Similarly, Osterlind (1997, p. 223) describes the very similar True-False tests, stating that they are criticized for their 50% chance of guessing the correct answer.

So, why not adjust the grading scale then, but use uneven distribution instead? Firstly, an adjusted grading scale in these 50/50 cases means that it is in effect shrunk to 50-100% which can give very small differences between the grades, especially if using few questions or using a grading scale which has many pass grades. Of course that in turn can be countered by having many questions but then the time for

constructing the test increases again. It seems that using penalties may be a better option in that respect.

As for guessing, Scharf and Baldwin (2007) discuss the mathematics of MCQs, i.e. the odds and possible outcomes, discussing the three formats of not using penalties, penalizing incorrect answers, and penalizing incorrect or missing answers, stating that the former encourages guessing, the latter has the least justification, whereas using penalties for incorrect answers *'on average, penalizes blind guessing, although a partial knowledge lessens the negative impact on a student's final mark'* (p. 17). According to Biggs (2003, pp. 180-181) one of the problems with the ordinary multiple choice test is that there are simple strategies that can be applied such as avoiding jargon-ridden alternatives in favour of long alternatives. Scharf and Baldwin (2007) similarly comment that the odds can be increased by omitting some of the alternatives. Using meta-analysis strategies rather than actually learning the content can be countered by taking great care in writing the distractors but as stated by Haladyna (2004, p. 69) *'Distractors are the most difficult part of the test item to write. A distractor is an unquestionably wrong answer. Each distractor must be plausible to test takers…'* This suggests that allowing a higher ratio of correct answers would simplify test construction.

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4.2.3 PATTERN: E-GEO-ASSESSMENT

SUMMARY

The combination of an educational technology standard for assessment with an open web map service (WMS) enables the creation of new types of questions to enhance the assessment of geographical skills. The potential of using multimedia maps allows for inclusion of new questions not possible with paper-based tests. By answering such questions and interacting with digital geography data the students can develop important educational skills.

PROBLEM

Geographical data has a significant role not only in geography, but also in other educational areas such as history, biology, geology and sociology. The problem presented here takes place especially in primary and secondary education. Teachers often use paper-based tests with blank maps as an assessment instrument to assess skills related with geographical information, but nowadays, this type of test is not sufficient to assess all the required skills included in an educational curriculum.

The geographical skills that a student needs to achieve have been augmented as a consequence of the popularization of web map applications (WMA) which offer functions for interacting with enriched multimedia geographical data. For the teacher, however, there is a problem in using a WMA for assessment purposes because the WMA has not been designed with educational goals in mind. So the problem this pattern tries to address is how to assess the kinds of geographical skills that students use when working with a WMA.

CONTEXT

The American National Research Council (National Research Council, 2006) supports the incorporation of Geographic Information Science across the K-12 curriculum. Geographical skills are present in the K-12 curriculum of most countries, for instance, the Spanish secondary educational curriculum indicates that students should be able to 'identify, localize and analyse geographical elements at different cartographic scales' and to 'search, select, understand and relate ... geographical information from different sources: books, media, information technologies'

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 305–310.

(Spanish Government, 2006). Students should also be able to understand processes and how humans influence the environment. Teachers need to assess these skills, and this is most appropriately done through the use of technology.

SOLUTION

Combine a WMA, e.g. Google Maps, Yahoo! Maps, OpenStreetMap, with the educational technology standard IMS Question & Test Interoperability (QTI).

The WMA has to provide an open Application Programming Interface (API). Google Maps (Google Maps, 2010) provides free access to the code of its services so that programmers can build their own applications on it, and so as an example of WMA for this pattern we will use Google Maps (Google Maps, 2010).

The importance of using an educational technology standard for assessment is to do with interoperability benefits. Educational technology standards support the deployment of compliant resources in different learning environments and facilitate the communication with other specifications or services (Bull & McKenna, 2004). QTI is the facto standard to develop Computer Assisted (formative and summative) Assessment solutions based on tests (QTI, 2006).

This combination enables us to benefit from the open aspects of an assessment standard and web map services (WMS), enabling interoperability with other learning services and standards, and the integration of large amounts of up-to-date geo-information provided by spatial data infrastructures. The result of this combination is the extension of the assessment standard with a set of new types of questions using the multimedia content and functionalities of the WMA.

The educational technology standard for assessment defines the main elements of the assessment activity: the structure of the test, the questions, the score, the feedback, and the results. Those elements have an eXtensible Markup Language [XML] binding format so that they can be interpreted by a software engine that visualizes the test. When a question is answered by the student, the engine computes the answer and sends an outcome result. An assessment standard defines a set of elements which can be extended using other services (in this case using the functionalities of the WMA). Taking the set of questions defined in the assessment standard and the interactions that the WMA offers, new types of questions can be created by a programmer. These questions have to be interpreted by an engine compliant with the assessment standard and with the WMA service (see an example of implementation in the Verification section below).

The result of combining the WMA and the assessment standard is a set of questions with interactive maps. The student has to answer the questions by interacting with the maps (for instance: zooming in or out, dragging geographical elements, drawing over the map or interacting with specific geographical information). Teachers can use this solution to create e-questionnaires which can help students to acquire the skills described in the context section above. The sorts of new questions that are made possible are:

- **Choice question:** This is a form of multiple choice question using a multimedia map as an image for the question. The difference from a classical multiple choice question is the use of the configurable parameters that a WMA offers. Examples:
  - Zoom: Users can change the zoom level of a map to contextualize the question.
  - Drag: Users can drag the map (using four possible directions: down, up, right and left).
  - Coordinates: The teacher can choose the latitude, longitude and maximum level of zoom of a map.
  - Appearance: The teacher can choose the layer of the map: satellite, road map (or a combination of both) or 3D.
  - Example: A satellite image (without text information over the map) of the island of Taiwan. The Drag functionality is activated (this means that the user can move the map which is visualized in a window). The question is: 'What is the name of this island?' and the four possible choices are: A. Honshu (Japan), B. Gran Canaria (Spain), C. Taiwan, D. Crete (Greece). By default the students see only the image of the island but they can use the drag functionality to explore the map in order to identify, localize and analyze other elements which characterize the zone. This type of question can also be formed using markers as choices (see an example in Figure1).
- **Order interaction:** The user has to select some elements of the question following a specific sequence. In this case, the user has to click in the correct order on the markers situated over a map.
- Examples:
  - A world map with the zoom functionality allowed has six markers over different regions of the world. The text question is: 'Order (from biggest to smallest) the regions with greatest number of people without access to potable water.'
  - The student can use the zoom to analyze the image in different scales, viewing the image of the entire world or a specific continent. He/she has to understand and relate the basic characteristics of the geographical diversity to be able to order the markers correctly.
- **Point within a polygon:** An invisible polygon has been set up to mark a region of the map. The user answers the question by dragging a marker over a region of the map. An algorithm verifies the correct position.
  - Example: The question is 'Where is Bangladesh?' The map contains a satellite image of the entire world. The student has to use the drag and the zoom functionality to localize and identify where Bangladesh is. If the student does not understand the different cartographic scales of a map, he/she cannot identify the correct position and so cannot answer the question.
- **Draw lines:** The user has to draw a line (or lines) over a map as the answer to a question. As in the 'Point within a polygon' interaction, a polygon (invisible to the

users) has been defined in the creation of the question. An algorithm determines if the line drawn by the student is within the polygon defined in the question.

– Example: The text of the question is: 'Draw an approximate frontier between Portugal and Spain'. The image shows a satellite map of the Iberian Peninsula with the drag functionality allowed. It is necessary that the student understands the territory and uses the drag functionality to better contextualize the image. The student has to draw the frontier by clicking with the mouse within the image.

In all of these types of questions students have to relate the text and the answer of the question with the digital information shown on the map. Sometimes it is necessary to use the zoom or the drag functions in order to answer the question.

SUPPORT

Source

The source for the pattern E-GEO-ASSESSMENT is the design narrative 'Assessment of geographical skills using interactive maps in an e-questionnaire' (4.1.3).

Supporting Cases

An exhibition at the Pompeu Fabra University (UPF, Barcelona) was set up with the objective of informing the students about the three campuses of the UPF. Students coming from different high schools interacted with the designed e-questionnaires which had interactive maps. These e-questionnaires helped students to explore the environment of the different campuses of the UPF. The participants answered questions which contained different types of maps containing information about the university. For instance the users had to localize the new campus of the UPF on a map (see Figure 1), and they had to place the three campuses of the UPF in order of the number of students in them.

This is an example of where questions with geographical interactions can be useful in cases of informal learning, as well as in the more formal learning example described in the associated design narrative. By interacting with these types of e-questionnaires, students were exploring the maps and answering questions, and so implicitly they were learning about the environment of the university and so the objective of the UPF organizers was achieved.

Theoretical justification

Computer Assisted Assessment (CAA) is the use of computers for assessing students' learning (Bull & McKenna, 2004). Information and Communication Technologies (ICT) enable the automation of assessment tasks such as marking the students' answers, providing feedback, designing e-questionnaires, establishing a bank of items, and creating new types of questions.

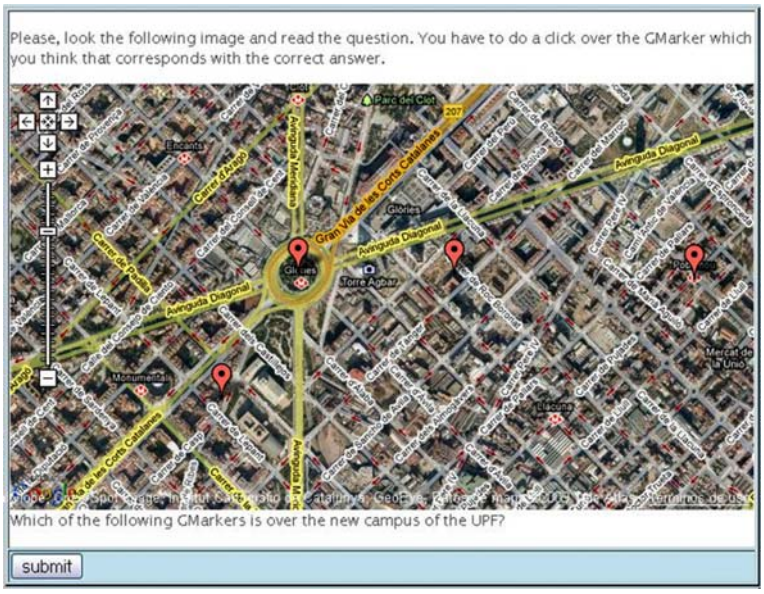

Figure 1. Question interactive maps to localize the new campus of UPF

In an assessment activity based on paper and pencil tests some valued skills are not easily tested by simple item formats, and as a consequence these tests do not represent the curriculum adequately (Bennet, 1993). New forms of answering questions are needed in order to collect new types of students' outputs (Cizek, 1997).

Paper-based tests are not suited to the assessment of some student skills, for instance those related with IT (Ridgway & McCusker, 2003). Unfortunately the majority of the e-assessment tools make a direct translation of the questions used in paper-based questionnaires into e-questionnaires, thus missing the potential of ICT to support new forms of testing (Conole & Warburton, 2005). The proposed pattern takes advantage of one specific form of the development of questions using a form of input based on spatial location.

Verification

The use of this pattern has been evaluated in a real education scenario - see the design narrative 'Assessment of geographical skills using interactive maps in an e-questionnaire'(4.1.3) - in order to analyse the learning benefits and the attitude that students had to interacting with QTI-Google Maps tests. The teacher was interviewed and the students answered a pre-test and a post-test questionnaire (before and after interacting with the QTI-Google Maps test). Additionally three researchers made observations during the study.

The teacher found that this type of test helped him to assess the geographical skills of his students (Navarrete et al., 2011). Due to the fact that the questions were assessed automatically, the teacher had more time to review the marks and special cases. Another benefit was that teachers could re-use and re-edit the questions. The students had a positive attitude to interacting with these tests. They were very familiar with web map applications (WMA) features, and the teacher was very surprised at the knowledge that the students had about these tools. The students found educational benefits from the experience, in particular they indicated that the interaction with the QTI-Google Maps test helped them to better remember the concepts, and they thought that WMAs provided enriched and up-dated information that was very useful for learning geographical concepts and for practicing geographical skills.

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4.2.4 PATTERN: FEEDBACK ON FEEDBACK

SUMMARY

Feedback given to learners should provide opportunities to improve the learning experience. It should comprise constructive feedback to improve learning as well as socio-emotive feedback. Tutors in large courses often resort to grading devoid of effective feedback. To support them in improving their feedback, they need effective feedback on the feedback they give.

PROBLEM

Effective feedback needs to:

- alert learners to their weaknesses
- diagnose the causes and dynamics of these weaknesses
- include operational suggestions for opportunities to improve the learning experience
- address socio-emotive factors.

Tutors may be aware of all these issues, but they still need guidance in structuring their feedback. Often, either from a lack of knowledge or limited resources, they resort to feedback which only covers the first requirement – that is they alert learners to their weaknesses. In order to improve their feedback, tutors need to be provided with effective feedback on the feedback they give to their students. This should be provided as close as possible to the event in order to allow them to adapt their strategies and recover from their mistakes. However, in large courses with many tutors it is a challenge to bring this about.

CONTEXT

This problem arises particularly in the context of large scale, technology supported, assessed courses where many tutors are instructing a large number of students. Such courses aim to provide both grading and formative feedback, and the tutors need support in order to provide effective feedback, but resources for individual mentoring of the tutors are not always available. Feedback in these contexts is often mediated by technology and therefore can be captured and processed in real time.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 311–313.

SOLUTION

The solution to this problem is to embed a mechanism in the learning and teaching system that regularly captures tutor feedback, analyses it, and presents the findings as a visual display or dashboard. Ideally, the analytical display should also include constructive advice as to how to shift from less to more effective forms of feedback.

In computer supported environments (e.g. VLEs), this mechanism could be integrated into the system, providing tutors with immediate analysis of their feedback, as well as long-term aggregates.

In unmediated environments (e.g. face to face classrooms), the same mechanism can be implemented by cross-observations between tutors, using a printed feedback tracking form.

SUPPORT

Source

The source for the pattern FEEDBACK ON FEEDBACK is the design narrative 'Open Mentor' (4.1.4).

Supporting Cases

A number of supporting cases which helped to develop this pattern are described in Whitelock (2006).

Theoretical justification

Black et al. (2003) argue that 'An assessment activity can help learning if it provides information to be used as feedback by teachers, and by their students in assessing themselves and each other, to modify the teaching and learning activities in which they are engaged. Such assessment becomes formative assessment when the evidence is used to adapt the teaching work to meet learning needs' (p. 2). The focus on teacher adaptation of pedagogy as one criterion of formative assessment emphasises a potentially long cycle of teacher learning which then impacts on student learning, though in some learning contexts there may be an immediate effect. There may be limited or no immediate gains for learners in some contexts, where teacher learning needs to adapt to more complex types of change. Although 'immediacy' is a feature of the concept of 'moments of contingency' (Black & Wiliam, 2009) in this pattern what is 'contingent' may also have longer-term developmental consequences for pedagogy as well as having immediate consequences.

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4.2.5 PATTERN: FORMATIVE EXCEPTION CLOSING THE LOOP FOR EXCELLENT STUDENTS

SUMMARY

The key focus of this pattern is on discussing the key features of formative assessment and the role that technologies can play in helping students that have performed well to replicate this performance across different contexts and situations.

PROBLEM

Students who have performed well in assessment tasks often receive feedback which is synoptic or only summative (a mark). Frequently, the assumption (made by tutors, but also by institutional assessment systems) is that no systematic feedback is required when students perform above average. Because of this, the 'closing the loop' component of the assessment process does not take place. Consequently students who have done well in assessments may find it difficult to transfer good practice to different contexts/situations.

Forces

Summative vs. formative assessment, monitoring of tutor assessment practice, formative assessment considerations, feedback, learning technologies, lack of face to face context.

CONTEXT

Formative assessment practices and the provision of feedback can be problematic in higher education, particularly in courses where the emphasis is on end-of-year assessments as the 'closing the loop' component of the assessment process very rarely takes place. For instance, students may not receive any feedback on exam performance, or feedback on assignments may not be systematic or developmental. The notion of continuous assessment that some distance learning institutions have endeavoured to put in place, however advanced, tends to be more of a periodic rather than of a continuous nature. Almost by default, most feedback is corrective, attempting to demonstrate to the students what they need to do to reduce the gap between achievement and desired performance. A possible drawback to providing

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 315–318.

generalised feedback is that it is not tailored to the needs of individual students unless it is customised by the tutor.

When there are opportunities for e-assessment, computer mediated communication can facilitate the provision of feedback and the dialogue between tutor and student. For example, the annotation of submitted assignments by the tutors, by using an editing or comment adding tool, can enhance the immediacy of written feedback. However, even when systematic feedback is provided through this channel, some tutors concentrate their efforts in providing feedback to students that failed or performed poorly and do not think it is necessary to provide comprehensive feedback to students who have performed well. Often feedback points to weaknesses and omissions rather than encouraging self regulation, and excellence is rewarded by praise or laconic confirmation that tasks have been accomplished.

In addition, there is quite often a prior conception that some praise such as comments of 'well done' or 'excellent' are self explicit and it is not necessary to explain to students what particular aspects of an assessment were excellent, i.e. a good summative mark 'speaks for itself'. It is not made obvious to the students what was excellent about their work.

SOLUTION

There are several aspects to the proposed solution:

- Some form of periodic assessment is necessary to ensure that monitoring progress and study support measures are in place for the students before they reach any end of assessment period examination. However, even periodic assessment may only play a summative role, if there is no opportunity for the students to revisit and use the feedback subsequently. The provision of systematic feedback can help, as students that have performed well have better chances of completing the 'closing the loop' component of the assessment process. The loop can be closed by identifying, negotiating and agreeing on actions to be taken by the student.
- An adaptive approach of providing feedback tailored to the needs of every student is required. This can be logistically difficult with big cohorts of students. However, one solution could be a concise template including feedback and developmental issues the students would need to consider, highlighting areas of excellence and how students can transfer good performance to other areas of achievement. The template could relatively easily be adapted or customised by the tutor for every student.
- Linking feedback to learning outcomes can point to the strengths of student work. Reflective activities can be embedded in the assessment cycle, e.g. by including 'learn how to learn' tasks that encourage students to think about the learning process and reflect on their performance.
- Formative assessment can enrich technology enhanced learning approaches by making the feedback central to all e-assessment activities and by directing the students to appropriate learning resources. Formative assessment can be facilitated

by the use of tools that encourage dialogue about feedback and assessment, such as computer mediated communication and social software (e.g. blogs and wikis). In addition, student peer review can be enhanced by the use of collaborative computer mediated communication tools, such as discussion forums and social software, to share good practice.

– Tutors can engage in peer review or self evaluation using the Hattie and Timperley (2007) framework to ensure that the feedback they provide leads to student self regulation.

SUPPORT

Source

The source for the pattern CLOSING THE LOOP FOR EXCELLENT STUDENTS is the design narrative 'A tutor's journey' (4.1.5).

Theoretical justification

The understanding of feedback as dialogue is fundamental to the process of 'closing the loop' in assessment (Sadler, 1989). Communication forms part of the mechanism by which the learner identifies and then bridges the gap between the current learning achievements and the goals set by the tutor (Hatzipanagos & Warburton, 2009). Juwah et al. (2004) have developed a conceptual model of formative assessment that represents a synthesis of current thinking by key researchers, it is based on the original model of self-regulated learning by Butler and Winne (1995) and includes work by Sadler (1983, 1989), Black and Wiliam (1998), Torrence and Pryor (1998) and Yorke (2003). The encouragement of dialogue around learning is viewed in this model as fundamental to effective feedback practices. Feedback is most effective if it moves students from task to processing and then from processing to self regulation (Hattie & Timperley, 2007). However, praise does not necessarily lead to self regulated attitudes. Often it is assumed that a 'pat on the back' is sufficient whereas in the categorisation of Hattie and Timperley (2007), this dialogue should lead from feedback about the task, to feedback about the processing of the task, to feedback about self regulation.

RELATED PATTERNS

This pattern is related to FEEDBACK ON FEEDBACK (4.2.4) and TRY ONCE, REFINE ONCE (4.2.7).

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4.2.6 PATTERN: GENERATE & USE AGREED STRATEGIES

SUMMARY

Students are enabled to review and develop their own strategies for tackling a set of tasks through a series of small group and whole group interactions that lead to a shared understanding and to recommendations for strategy. All students have opportunities to share and discuss their ideas so that a wide range of ideas can be reviewed

PROBLEM

The problem was to enable students to review and develop their own strategies for tackling a set of tasks. In the design narrative that this pattern was derived from, the problem was to enable students to develop strategies for reading academic papers in order to obtain material for their assignments. There were two key features of this problem that lead to its solution. Firstly, there were both general elements of strategy that many people might use and also individual preferences, so each person needed to review their own strategy and develop something that worked for them. Secondly, the group had a range of different experiences and expertise relevant to the problem. Other problems that could benefit from applying this pattern might include developing: study skills, problem-solving strategies, approaches to dealing with people in particular situations.

CONTEXT

The pattern can be applied wherever a group of students needs to develop strategies for tackling a set of tasks and half or more of the group have had some experience of carrying out these tasks or similar tasks. If there is very limited experience in the group then the pattern would be inappropriate or would need to be modified because the group would be unlikely to generate sufficient ideas.

SOLUTION

The solution depends on alternating between small group and whole group interaction. During small group work all students have opportunities to share and discuss ideas so that a wide range of ideas can be reviewed. The more promising ideas can be

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 319–421.

identified and weaker ideas can be examined and discarded. The teachers' role is to monitor, assess and feedback either into the small group discussion or into the whole class discussion. In whole class discussion ideas can be pulled together, unresolved issues reviewed by the larger group, and the group can move towards a shared understanding. The teacher may steer this process to a greater or lesser extent based on assessment of the range of students' needs within the class. The solution proceeds in steps:

– In pairs or small groups brainstorm strategies for approaching the task.
– As a whole group, share strategies or ideas from the small groups. One idea from each group in turn is proposed, displayed on screen and discussed. Thus a list or set of ideas is developed and adjusted through the discussion. This shared construction is supported by technology that allows all students to view the developing ideas of the class on a large screen and later to view them on their own computers, e.g. wiki or shared word processor such as Google Docs. This results in a list of shared and agreed strategies/guidelines, perhaps with exceptions or caveats.
– Pairs or small groups use the guidelines developed in Step 2 to support them in carrying out a specific example of the task. This is supported by a word processor. While they do this task they not only discuss and make notes for the task itself but also on how well the strategy works.
– As a whole group, students share their comments from Step 3 and discuss them. Again they are supported by technology that allows edits made by any group of students to be viewed instantly by the class on a large screen and later on their own computers, e.g. a wiki, or shared word processor such as Google Docs.
– Individuals practise using the strategy and possibly iterate from Step 2 if the students or teacher judge that further development of the strategy is needed.

SUPPORT

Source

The source for the pattern GENERATE & USE AGREED STRATEGIES is the design narrative 'Reading academic papers' (4.1.6).

Theoretical justification

The solution focuses on 1) enabling students to reflect on their own strategies and skills and whether they need to develop or improve them and 2) generating a range of ideas from students' own varied experiences. Using an approach based on Vygotskian social constructivist theory of learning (see Sullivan Palinscar, 1998) it is important that all students have an opportunity to share and discuss their own ideas and compare them so that they are aware of, and reflect on, their own thinking. Furthermore, this process of sharing supports participatory knowledge creation that may enable one or more of the following: commonalities to be identified, agreed

principles to be specified or improved approaches or strategies developed. Students are 'activated as instructional resources for one another' (Black & Wiliam, 2009). The resulting outcomes from this process can be used by a group in practice and the results of applying the strategies can also be shared amongst the group.

RELATED PATTERNS

This pattern is related to two patterns described in the project 'Scoping a vision for formative e-assessment' (Pachler et al., 2009) – ROUND AND DEEP and USE MY STUFF.

The round and deep pattern, in common with this pattern, is concerned with enabling students to review and develop their own understanding through examining ideas from their own and their peers' previous experiences. There are two essential differences between these patterns. One difference is that the round and deep pattern is focused on developing understanding of one concept with all its complexity and application, whereas this pattern is concerned with developing a strategy that may involve understanding various concepts as they apply to this strategy. The other difference is that in generating a strategy, the description of the agreed strategy is co-constructed by the whole group and is evaluated by all participants as an essential part of the process. In the ROUND AND DEEP pattern there are various presentations produced by students from different perspectives.

The USE MY STUFF pattern, in common with this pattern, invites students to share their approaches and tools. In both patterns this sharing provides the teacher with important assessment information. However, the USE MY STUFF pattern is concerned with learning particular techniques that need to be demonstrated rather than developing approaches and strategies through discussion. The two patterns are complementary and in deciding which one to use a key consideration is whether the learners need to learn more specific techniques or whether they need to think about how to deploy them. Within a teaching sequence focused in enabling students to solve problems or tackle complex tasks switching between these two patterns may be a productive approach.

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4.2.7 PATTERN: TRY ONCE, REFINE ONCE

SUMMARY

A *two-step* question answering/exercise/assessment system which encourages students to consider their initial answers to skills-based problems carefully and to subsequently, on receiving feedback on their errors, give just as much thought to the refinement process prior to submitting an improved version.

PROBLEM

This pattern is particularly relevant to the formative assessment of skills-based courses. A typical approach in this context is to set students exercises which allow them to practise the requisite skills, and then to give feedback on errors. However, students often pay far less attention to feedback than tutors would like them to. If there is a significant delay in providing feedback the situation is further exacerbated. Even when there is little or no delay, students are often more interested in the mark received than learning where they went wrong and what to do about it. If students are not encouraged to give proper consideration to their errors, nor to correct their faulty mental models in a timely fashion, these erroneous assumptions can become fossilised.

Forces

The TRY ONCE, REFINE ONCE pattern is an attempt to provide students with an effective incentive to correct their work (and faulty mental models) before error fossilisation occurs. In this assessment mode, students are permitted to resubmit incorrect work as soon as feedback has been received, with the incentive to do so being the possibility of an improved overall mark (since this appears to be particularly motivating).

CONTEXT

This pattern works best for skills-based learning situations where multiple misconceptions are possible. The range of assessment types the approach is suitable for encompasses those in which student answers typically contain a number of errors, for which detailed feedback indicating the source and type of each error can be provided without revealing exactly what must be done to correct them.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 323–327.

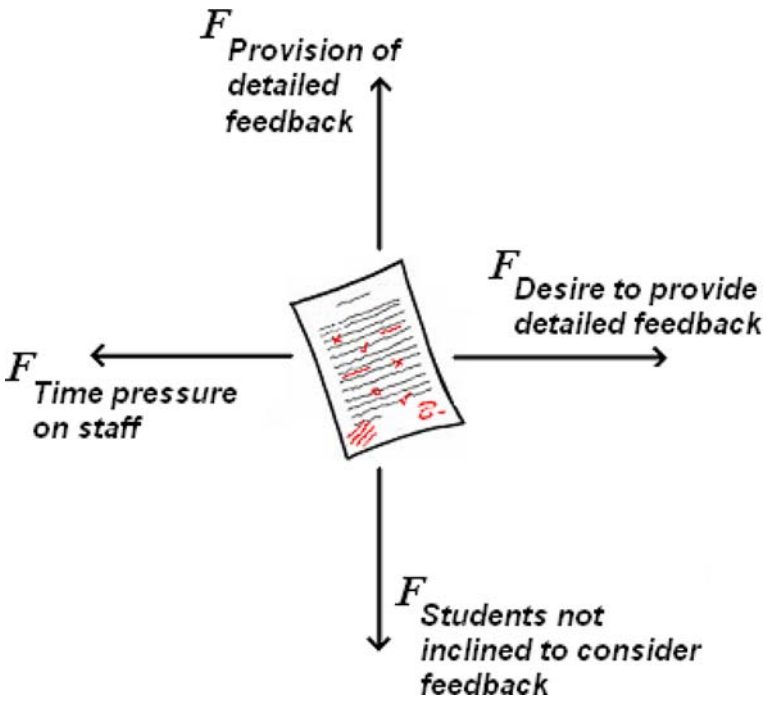

Figure 1. Forces affecting the success or failure of feedback.

The pattern was originally developed for online language learning exercises and is particularly applicable to this domain, but it might also work for other skills-based fields such as mathematics, computer programming and natural sciences. The model works best if feedback can be provided fairly quickly – while the student's mind is still on his or her answer and the thought processes that led to it. Since the pattern obviously involves each submission being marked twice, it is best applied where marking can be automated or handled in some other way that does not put additional pressure on staff (for instance where peer-marking is possible).

SOLUTION

Whether this pattern is used with large coding assignments for Computer Science or short translation questions for language learning (or indeed any other form of assessment to which it is suited), student submissions should be marked and feedback returned within an optimum period of time.

Try: The 'try' step is the student's initial attempt. If the submitted answer is entirely correct a mark of 100% is awarded and the process terminates at this point. However, if the student's submission contains errors then an interim mark reflecting

the degree of accuracy of the answer is given, along with detailed feedback on the location and type of the errors. The interim mark contributes to a percentage of the total score for the question/assignment.

Refine: If the 'try' submission was not completely correct then the 'refine' step is initiated. This allows students a second answer attempt, in which they endeavour to refine their previous submission. After this second attempt, feedback on any residual (or newly introduced) errors is given, along with the correct answer or answers. The mark for this attempt contributes to the remaining percentage of the overall question/assignment score.

The marks for the 'try' and 'refine' stages are unequally weighted, with more importance being given to the first ('try') attempt. The ratio can vary, but showing a distinct favouring for the first submission works best, since this ensures that students give careful consideration to all components of their first answer, and equally careful consideration to improving it in the face of the feedback. If the ratio is skewed too far in favour of the second ('refine') attempt then students tend to exhibit less care over the construction of their initial answer. If the ratio is skewed too far in favour of the first attempt then students are less inclined to repair trickier errors. However, the marks ratio should be adjusted according to the amount of information in the feedback – the more information it carries, the lower the portion of the mark contributed by the second attempt should be.

No further attempts at answering beyond the second are permitted. This limit, coupled with the unequal weighting of the marks for the two tries, proved to be very important. Allowing students to resubmit faulty work introduced a new problem – if multiple resubmissions were permitted some candidates adopted a mindless iterative approach to the work, in which they began with a 'stab-in-the-dark' and then allowed themselves to be guided step-by-step to the correct answer – often via numerous minimally altered attempts.

SUPPORT

Source

The source for the pattern TRY ONCE, REFINE ONCE is the design narrative 'String comparison in language learning' (4.1.7).

Supporting case

Post-16 string comparison (Fowler, Daly & Mor, 2008).

Theoretical justification

One of the strengths of this pattern is that students are not given access to model answers until they have had the chance to properly consider the problems with their

original submissions. In the context of language learning (the domain from which this pattern arose), Ferreira and Atkinson (2009) divide feedback strategies into Giving-Answer Strategies (GAS) in which target forms corresponding to students' errors are provided, and Prompting-Answer Strategies (PAS) in which students are 'pushed' to notice and 'repair' errors for themselves. Using different experimental settings, they found that in a tutorial context PAS seemed to promote more constructive learning.

Ferreira and Atkinson's work enhances the findings of Nicol and Macfarlane-Dick (2006) who maintain that good feedback practice includes, among other things, activities which 'facilitate the development of self-assessment (reflection) in learning', and which provide opportunities to 'close the gap between current and desired performance'. Under the latter category come those activities which present opportunities to repeat a particular 'task-performance-feedback cycle', and allowing resubmission of work is an obvious means of doing this. Sadler (1989) also stressed the importance of providing chances for students to act on feedback, because without that possibility it is impossible to tell whether or not the feedback results in learning. Boud (2009) backed this up, pointing out that teachers may not be able to gauge the efficiency of their feedback if their students cannot use it to produce improved work.

This pattern addresses the issue of acting on feedback, but imposes the restriction of a single resubmission. As mentioned previously, allowing multiple attempts at answers was not found to be beneficial, since this led to the provision of feedback in an iterative fashion, hindering effective learning because students were able to 'grope their way' to a correct solution without having to think about each answer as a whole.

In the field of Computer Science, Malmi and Korhonen (2004) in researching automatic feedback and resubmission found results indicating that allowing high to unlimited numbers of resubmissions discouraged what they called 'active pondering'. In other words when allowed numerous resubmissions, learners did not concentrate on finding their own errors, instead they used the automatic assessment system as a sort of debugger, trying solutions to see if they worked, and if not, trying something else. In a follow-up paper (Malmi & Korhonen, 2005) it was noted that when multiple submissions were permitted, about 10% of students spent an unreasonable amount of time on exercises, i.e. one that was disproportionate when measured against their examination performance.

Hattie and Timperley (2007) argue that 'The degree of confidence that students have in the correctness of responses can affect receptivity to and seeking of feedback', and cite the work of Kulhavy and Stock (1989) who noted that if confidence or response certainty is high and the response turns out to be a correct one, little attention is paid to the feedback and that feedback has its greatest effect when a learner expects a response to be correct and it turns out to be wrong. As Kulhavy and Stock noted, 'high confidence errors are the point at which feedback should play its greatest corrective role, simply because the person studies the item longer in an attempt to correct the misconception' (p. 225). With this pattern, the greater

proportion of the marks will be given for the first attempt, and so students are likely to give answers in which they have a considerable degree of confidence – and so, if the answer is then found to be incorrect, this would be a situation where the feedback would be likely to be most effective.

RELATED PATTERNS

A closely related pattern is GRADE IT AGAIN SAM (Bergin et al., 2002).

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4.2.8 PATTERN: HINT ON DEMAND

SUMMARY

Students in mathematical courses at university have to work on weekly exercises in addition to attending lectures. Most of these exercises can be solved by performing several discrete steps, but for students they can seem complex and many of them have difficulties in carrying out these exercises. These difficulties can usually be overcome by hints given by a tutor, but students working alone cannot get access to this support. Similarly, tutors cannot provide this support to students in large classes. In this pattern, the proposed solution is to make hints accessible in a semi-automated way. Hints for expected mistakes, or on notation problems, will be given automatically. Hints for specific individual problems will be given by the tutor. The hints are given when the learner actively demands them and not before he/she has started working on the task.

PROBLEM

In many subjects at university students have to work on weekly exercises to practice what they have learned in addition to attending lectures. Students will follow different approaches in the use of solution processes even though the tutor may have a clearly intended goal for the exercises. These exercises, which have several different possible solutions, can seem difficult and complex, in particular for students in introductory courses. Many students avoid working on a task after a first glance because they think that they cannot handle it. Every task that cannot be solved decreases the student's motivation and reinforces a negative attitude towards the subject. In many cases, one or a few hints at the right time would suffice to enable the student to master the task.

In face-to-face situations like tutorials, open learning scenarios such as tutors' office hours (Zimmerman, 2012) or small courses, lecturers or tutors can immediately offer clues or hints on the students' solution processes. They can directly intervene when they see that students get stuck. In contrast, when the learners are on their own, e.g. working at home, or in a course with many participants, there is hardly any possibility to get prompt hints on the solution process. Lecturers could offer hints on expected difficulties to students before they start working on the exercises, but this strategy has some disadvantages. Firstly, good students are able to solve the

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 329–335.

exercise without any hints; providing hints at the beginning would bore them or even keep them from working on the task. Too much of the solution could be revealed beforehand by these hints, making the exercise too easy for them. Secondly, novices usually cannot remember a large number of hints, and they may get confused by too many hints if they haven't experienced the problem yet. In addition, weak students may need assistance during the solution process to make up a solution in the first place, while good students may need hints afterwards on minor mistakes such as use of incorrect notation.

Forces

The forces in tension in this pattern are:

- *Number of participants*: In introductory courses with a high number of participants, giving hints to each student takes too much of the lecturers' or tutors' time. Many of the students' problems are common problems, thus similar hints have to be given many times.
- *Individual hints*: Good students may be able to solve the problem on their own without any additional hints other than on minor issues of notation etc. Other students may need assistance to develop a solution in the first place. Furthermore, most learners first have to realize that there is a problem before they can recognise a hint as helpful.
- *Difficult tasks*: At first view, a mathematical task may seem unsolvable for many students. Without clues, they quit working early or even refrain from trying to solve the task in the first place. This can lead to a decrease in motivation for mathematical tasks and in the students' mathematical self-efficacy expectations.
- *Hints at the right time*: Tutors often give numerous hints before the learner has worked on the task in order to avoid expected difficulties. However, novices usually cannot remember a large number of hints, or may even get confused by them. For good students, revealing too much of the solution beforehand can make working on the task too easy and possibly boring.

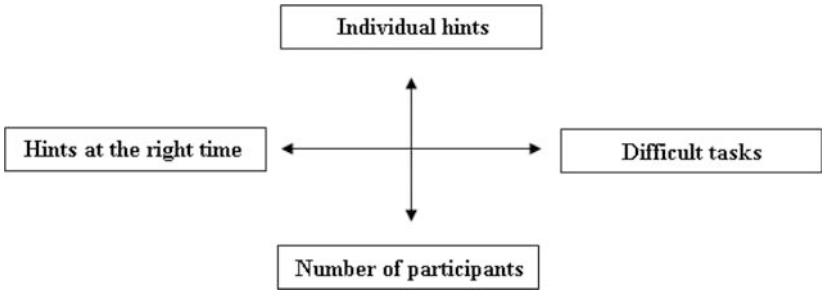

Figure 1. Diagram showing the relationship between the forces.

CONTEXT

Hints can be given in every situation in which a learner is at a loss, for example when they have arrived at an incorrect solution, when they get stuck, or when they don't know how to get started. Hints help learners to start or to continue working on exercises. Even though this pattern can be transferred to other subjects, we will concentrate on mathematics, as this subject is a component of many study courses such as medicine, computer science, and psychology.

In mathematics courses at university, students have to solve weekly exercises and hand them in to the lecturer or tutor. Most of the exercises can be solved by performing several discrete steps, such as transforming a term, substituting a variable, or drawing a triangle. Weaker students often get stuck on one of these steps, and some of them simply copy the solution from better students. Their understanding of mathematics decreases, and mathematics become a mystery to them.

In computer-based tasks or learning scenarios in mathematics, the situation is quite similar. As students work on computer-based exercises, problems can occur during the solution process. Many e-learning applications only provide help on the functions of the application, but not on the problems that may occur. As a consequence, the learner puts off working on the task, and the motivation to work with e-learning applications in general can decrease.

SOLUTION

Exercises can be differentiated into objective and non-objective tests (Bull & McKenna, 2004). In objective tests, such as multiple-choice tests with only one correct solution, hints can help the learner to recall the necessary knowledge. Hints for objective tests are easy to give as the solution space is narrow, so we will not concentrate on these kinds of tasks. Most mathematical tasks, however, are non-objective because there are a great number of possible correct solution processes. For example, there are several ways of proving a mathematical theorem, and the tutor cannot predict how the students will approach the exercise. In our solution, hints can be accessed in a semi-automatic way. Learners working on their own can get access to hints any time.

Hints on frequently asked questions or frequently described problems (e.g. hints on format, notation, or orthography) should not be given in the lecture or attached to the assignment sheets. Weaker students would get confused, as they cannot relate these hints to the exercises. Such hints can be prepared beforehand and deposited in online forums or Learning Management Systems (LMS) in a way that the learner can fetch them when he/she requires them. Students can access these 'automated' hints at any time during their solution process once they have explored the problem space, so that the hint can better be anchored with regards to the content, making it possible for the student to reflect upon his/her solution process. Ideally, the learner will have attempted several (ineffective) solution steps before asking for a hint. In order to

increase the learner's performance on the task, hints should be given at different levels. For example, access to a more detailed hint should only be provided if less detailed hints have been read before. Unusual or quite specific hints still have to be given by the tutor in person. Learners have to write an email or talk to the lecturer or tutor by phone or in face-to-face tutorials. Because tutors need not concentrate on common questions or problems, they have more time for unusual solutions and weaker students.

Computer-based exercises can ease the tutorial work by giving feedback to standard solutions and mistakes (Bescherer & Spannagel, 2009). They use intelligent assessment algorithms to evaluate each solution step with regard to different criteria. These tools can be extended so that an additional hint is available for each feedback message. This hint function has to be limited in a way that prevents students from solving the task by just requesting a hint for each solution step (Aleven & Koedinger, 2000). This restriction can be realized by limiting the number of hints a student can request per exercise. For more detailed or specific hints, students can contact their tutor.

SUPPORT

Source

The source for the pattern HINT ON DEMAND is the design narrative 'A learning tool for mathematical proofs with on-demand hints' (4.1.8), which describes one of the tools developed in the SAiL-M project (Semi-automatic Analysis of individual Learning Processes in Mathematics, funded by the Federal Ministry of Education and Research (BMBF) from 10/2008 to 02/2012). When the learner uses a tool like ColProof-M, he/she can take hints to complete or to improve his/her solution.

Supporting Cases

The interactive geometry software Cinderella (Richter-Gebert & Kortenkamp, 2012) incorporates an intelligent tutoring system. When doing an exercise using this tool, students can ask for a hint. The software then decides, based on the constructed geometric objects, which hint could be adequate and in which way it should be given. The software only uses a single reference solution for comparison with the learners' partial solution. This approach is described by Müller et al. (2006) and by Bescherer et al. (2012).

The OU Exercise Assistant (Heeren et al., 2010) is another e-learning tool in which students have to reduce propositional expressions. After each transformation entered by the user, a system checks the solution step and automatically provides feedback whether the solution is correct or incorrect. If the learner does not know the next transformation step, he/she can either request a hint or ask for the entire next step. In this case, it is possible to finish the exercise via the auto-step function.

Theoretical justification

When students work on mathematical problems, students need individual and just-in-time help (Ames, 2001). Students can then continue working on the problem without losing too much motivation and time. In our context, the term 'help' could equally be understood in the sense of 'hints'.

Giving hints on different levels of detail is an idea described by Wood and Wood (1999). The theory of contingent tutoring indicates that tutors should give hints related to the learner's problems. When the first hint does not lead to success, the tutor has to give a more detailed, or more explicit, hint. The first level of hints can be questions which point to a possible solution, e.g. 'Did you already try XY?' or 'Think about a way you can also reach XY!' Further levels of hints can be more precise and contain explicit advice.

Guiding the students' solution processes relies on the 'scaffolding' teaching method of the cognitive apprenticeship model (Collins et al., 1989, p.428). A tutor supports the solution process of the students by giving help or hints. A scaffold to solve the task can be built for the students, who can use it to solve the problem. The support can be reduced ('fading', ibid: p.482) when the students have fewer problems. Similarly, in our concept, students work on exercises to practice their understanding of the contents of the lectures. When students get stuck, tutors can give more or less detailed hints which allow the learners to finish their individual solutions.

Verification

In the SAiL-M project, we worked with an unusual philosophy of introductory courses for mathematics. At the University of Education in Ludwigsburg, students did not have to hand in weekly tasks for assignment. Tutors also did not give 'the correct' solution, and students were not required to present their solution in tutorials. Instead, they worked on the weekly exercises in small groups supported by tutors. The tutors guided the students by giving hints or asking questions about the exercises. This encouraged the students to reflect on their actions. This constructivist approach is described in the ACTIVATING STUDENTS IN INTRODUCTORY MATHEMATICS TUTORIALS pattern by Bescherer et al. (2008).

RELATED PATTERNS

- TECHNOLOGY ON DEMAND (Bescherer & Spannagel, 2009): Students should be able to use software for solving problems whenever they think it will be useful. They have to learn when to use which software in which context.
- HELP ON DEMAND (Bescherer & Spannagel, 2009): When students use software to solve a task, they often need help regarding the technical use of the application. These difficulties can distract them from the learning contents. An on-demand help function can help students to stay focussed on the mathematical problem.

- FEEDBACK ON DEMAND (Bescherer & Spannagel, 2009): Students should be able to get process-oriented feedback when they need it even in courses with many participants. Lecturers should also be able to select interesting (correct or incorrect) solutions for discussion of mathematical processes in the lectures.
- TRY ONCE, REFINE ONCE (4.2.7): Students should be able to resubmit a corrected version after getting feedback on their initial answers.
- FEEDBACK ON FEEDBACK (4.2.4) Tutors need to receive feedback on their own feedback. This is also true for hints they give. Also, the feedback and hints that are automatically generated by e-learning applications must be evaluated and improved.
- BLENDED EVALUATION (4.2.1): Hints can come from different sources, e.g. from peers, from tutors, or automatically generated from tools.

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4.3.1 SCENARIO: ASSESSMENT AND FEEDBACK

INTRODUCTION

This section presents a development of a scenario that was originally constructed by a group of tutors during the JISC funded project 'Scoping a vision for formative e-assessment' (Pachler et al., 2009).

SITUATION

The setting for this scenario is any teaching situation in which some students are able to succeed completely at the task set.

TASK

In these teaching situations the students who do very well on the tasks typically receive very little in the way of formative assessment or feedback, beyond perhaps a 'Well done', whilst their colleagues who do less well receive significant feedback. This situation can for example arise through the use of a number of patterns in this section such as TRY ONCE, REFINE ONCE; HINT ON DEMAND; CHAOTIC MULTIPLE CHOICE and E-GEO-ASSESSMENT, and therefore can be seen as a potential liability of those patterns. We wish to ensure that students who are doing well receive more feedback.

PATTERNS

FORMATIVE EXCEPTION: CLOSING THE LOOP FOR EXCELLENT STUDENTS – helping students that have performed well to replicate this performance across different contexts and situations.

SHOWCASE LEARNING (described in Pachler et al., 2009) – Publicly celebrate student work.

CLASSROOM DISPLAY (described in Pachler et al., 2009) – Share learners' work with a trusted audience. Create a space within the learning environment where learners' works can by displayed side by side.

BLENDED EVALUATION – Blended evaluation is employed to consider a mix of self evaluation, peer evaluation and instructor evaluation in the assessment phases of a course. While the process is more demanding for all involved, it caters for increased student involvement and transparency of the evaluation and grading process.

Y. Mor et al., (Eds.), Practical Design Patterns for Teaching and Learning with Technology, 337–338.

FEEDBACK ON FEEDBACK – Feedback given to learners should provide opportunities to improve the learning experience. It should comprise constructive feedback to improve learning as well as socio-emotive feedback. Tutors in large courses often resort to grading devoid of effective feedback. To support them in improving their feedback, they need effective feedback on the feedback they give.

SOLUTION

There are two aspects to the proposed solution:

- Providing feedback to those who achieve well. Four patterns suggest a range of ways in which this might be done. The pattern FORMATIVE EXCEPTION: CLOSING THE LOOP FOR EXCELLENT STUDENTS suggests ways of supporting teachers in developing approaches to giving feedback to all students. The pattern SHOWCASE LEARNING suggest publicly celebrating students' work as a means of encouraging feedback from peers and tutors. Similarly CLASSROOM DISPLAY suggest creating a space within the learning environment where learners' works can by displayed side by side, again to encourage feedback from peers. The pattern BLENDED EVALUATION suggest ways in which peer and self evaluation can play a role in the evaluation of students' work alongside tutor evaluation, and this can also lead to a greater level of feedback to students who are succeeding at a task, about what was good about what they did and how it might be further developed and applied in the future.
- The training of tutors to provide appropriate feedback. The pattern FEEDBACK ON FEEDBACK in which tutors receive feedback on the feedback that they give to students, can help them to identify appropriate types of feedback in this particular context.

REFERENCES

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