Learning Technology

publication of

IEEE Computer Society's

Technical Committee on Learning Technology (TCLT)

Volume 12 Issue 3 | ISSN 1438-0625 | July 2010

From the Editors …

Welcome to the July 2010 issue of the Learning Technology newsletter.

Collaborative learning attracts increasing interest worldwide: theoretical studies demonstrate that collaboration can form the basis for effective learning; technology can support numerous forms of collaboration; and learners engage in collaborative activities in their everyday activities within the networked, knowledge-based society. This issue introduces papers which describe how technology can support collaboration with the aim of building more effective learning environments.

Cohen, et al., describe a peer-based learning network that has been set up to support medical assistance in homecare settings. Jiang, et al., introduce a web-based workspace (currently under development) which is designed to support student teams in learning as well as the submission process of their distributed assignments during a semester-long project. Rego demonstrates that a combination of web 2.0 tools and a collaborative approach to learning can assist target language acquisition among learners. Tambouris, et al., investigate the potential of Web2.0 technologies for supporting innovative pedagogies such as Collaborative Learning and Problem-Based Learning (PBL), and present a specific CSCL system. Lin, et al., propose a new group formation approach for CSCL which is based on learners' prior knowledge and is implemented through particle swarm optimization. Tacke & Hobus describe a case study of a free public wiki aiming to stimulate collaborative knowledge production in a university setting. Finally, Verhaart discusses how wikis in general and MediaWiki in particular can be used for teaching and learning through case study examples.

The issue also includes a section with regular articles (i.e. articles that are not related to the special theme on collaborative learning). Caudill reviews and discusses the evolution, current state and future trends of the online education industry and market. Ikuta & Sculthorp present the intellectual and technical infrastructure that has been developed and deployed for modeling accountability and transparency in learning achievement in a specific university. Vignollet, et al., describe a study which aims to investigate the commonalities and differences between work flow management and learn flow management, in order to help the two domains to capitalize and exchange results. McCarthy & Scroggins describe the development of a SCORM-conformant learner model, which aims to overcome the limitations of SCORM in relation to representing learner information in a manner which is adequate for developing adaptive courses. Kirkham discusses personal data security in lifelong learning. Finally, Veglis describes a data visualization course for journalism students.

We sincerely hope that this issue will help in keeping you abreast of the current research and developments in Collaborative Learning through TEL as well as advanced learning technologies in general. We also would like to take the opportunity to invite you to contribute your own work on technology enhanced learning (e.g., work in progress, project reports, case studies, and event announcements) in this newsletter, if you are involved in research and/or implementation of any aspect of advanced learning technologies. For more details, please refer to the author guidelines at http://www.ieeetclt.org/content/authors-guidelines.

Deadline for submission of articles:	**September 20, 2010**
Special theme of the next issue:	**Pervasive Learning and Usage of Sensors in Technology Enhanced Learning**

Articles that are not in the area of the special theme are most welcome as well and will be published in the regular article section!

Editors

Sabine Graf
Athabasca University, Canada
sabineg@athabascau.ca

Charalampos Karagiannidis
University of Thessaly, Greece
karagian@uth.gr

Special Theme Section: Collaborative Learning Supported by Technology

Towards peer-based learning to support medical assistance in homecare settings

With an aging population, home healthcare solutions are becoming, by necessity, more prevalent. Caregivers and patients alike face the challenge of making medical decisions in dynamically changing environments, using whatever resources are available in the home.

Our research aims to provide important decision-making support in these scenarios by leveraging the learning of peers through a social networking approach. In particular, we propose that peer-based tutoring form the basis of the information imparted to homecare caregivers and patients. Distinct from other approaches to peer-based intelligent tutoring which assume an active social network of information exchange in real-time (e.g. [3]), we propose a framework that makes use of learning experienced by peers at several points in the past. In essence, we seek to adopt an approach to learning that respects what McCalla has referred to as the ecological approach [2]: enabling various learning objects (texts, videos, book chapters) to be introduced to peers, based on the past experiences of other, similar, students with these learning objects.

An example scenario helps to motivate our research. Consider a diabetic patient, attempting to manage his disease. Monitoring glucose levels becomes important and the patient seeks resources which inform about how best to perform that monitoring (with what frequency, using which methods, etc.). Distinct from an approach of simply posting a query to a discussion group and receiving various responses from peers (with varying degrees of reliability), one would treat this problem as one of properly teaching the patient suitable information that may be contained in a variety of online articles or instructional videos. We assume a corpus of these learning objects exists and has been experienced by other peers in the past. Pre- and post-testing of the learning achieved by these peers is conducted (for example, through an exit quiz that results in a level of understanding represented as a grade achieved, before and after the interacting with the learning object). Then, each learning object has stored with it the students who have experienced it, along with the benefit that each students obtained (an increase, or decrease, in grade level achieved).

In determining which learning object to display to a new student, we propose three distinct methods. The first focuses on presenting to new students those learning objects which produced the most benefit to like-minded peers, where the similarity between students is determined on the basis of their overall level of knowledge. This approach is motivated by collaborative filtering techniques, as performed in recommender systems [1]. For example, those learning objects which resulted in a weak understanding for other similar patients would be avoided for the new student.

The second proposal is to enable the peers to influence the determination of learning objects which will be considered. While an initial corpus will be introduced, once a peer has experienced learning, it will be possible to suggest, for example, subdividing an existing, lengthy learning object into a smaller, cogent element, which is strongly recommended to other students. Continuing with the motivating scenario of informing homecare diabetic patients, there may be a particular article in a book on managing diabetes which is of special value. As with our algorithm for recommending learning objects, the determination of which of these smaller articles to present to a peer will be based on the learning that is experienced by others. The object would be added to the corpus and then its overall benefit to peers can be tracked. It is possible that for one population of (perhaps more advanced) students a more targeted, succinct learning object would be preferable, while for another population of students a learning object with additional explanations may be preferable. In addition, one can manage the entire corpus by eventually discarding learning objects that are not of use (garbage collection), resulting in a refined and more valuable corpus on which the learning may proceed.

The final element that we propose for peer-based home healthcare management is the introduction of commentary, or annotations, to each of the learning objects in the corpus. Again, in an effort to best represent the learning experienced by peers, one allows each peer to leave behind comments on the learning object. Whether these particular comments would be displayed to a new peer would be decided based on the similarity of the peer who left them, but also on the inherent trustworthiness of that peer (and her annotations), using methods from multiagent trust modeling that we have explored in our previous research [4]. This particular representation of an agent's reputation combines both personal reflection of the value of the agent and overall public perception of that agent's reliability. In addition, the overall impression of the value of the annotation (by all peers) can be integrated into our algorithm for determining whether an annotation is shown.

In all, we believe that home healthcare can be improved by enabling patients and caregivers to learn on the basis of the past learning of their peers, through judicious choice of material to present to the learners, which evolves over time as the learning experiences of the peer group expand.

References

[1] Breese, J. S., Heckerman, D., and Kadie, C. (1998). Empirical analysis of predictive algorithms for collaborative filtering: 43-52.

[2] McCalla, G. (2004). The ecological approach to the design of e-learning environments: Purpose-based capture and use of information about learners. Journal of Interactive Media in Education: Special Issue on the Educational Semantic Web, 7: 1-23.

[3] Vassileva, J. (2008). Toward social learning environments. IEEE Trans. Learn. Technol., 1(4): 199-214.

[4] Zhang, J. and Cohen, R. (2007). Design of a mechanism for promoting honestyin e-marketplaces. In AAAI: 1495-1500.

Robin Cohen
University of Waterloo
Waterloo, Ontario, Canada
rcohen@uwaterloo.ca

John Champaign
University of Waterloo
Waterloo, Ontario, Canada
john.champaign@gmail.com

Web-based workspace: supporting student teams in Usability engineering Course

The ability to collaborate with other people is demanded in college students. Domains like usability engineering require interdisciplinary knowledge and skills. Effective collaboration and sharing of knowledge is the way to utilize all necessary expertise. To prepare our students with required knowledge, we made a serial of efforts in our usability engineering education in PennState University (Ganoe, Borge, Jiang, Carroll & Rosson, 2009).

We will introduce a web-based workspace, under development, which is designed to support students in learning and support their distributed assignments during semester-long projects (Carroll, Borge, Ganoe & Jiang, 2010). The system had its debut in the 2010 spring, serving a usability-engineering course (http://ist413.ist.psu.edu).

Introducing collaborative competency into the class

To harness students with proper collaboration skills, we introduced *collaborative competency* (Borge, 2007) to the students. We adapted its four collaborative capacities: communication, planning, critical evaluation, and productivity (Borge & Carroll, 2010). Along with usability engineering knowledge, we also gave students systematic training on collaboration. For example, we gave student teams collaborative capacity guidelines to help their semester-long projects, such as helping them to plan ahead and conduct effective meetings.

Capacities	Objectives
1. Communication	- Most members participate during discussions and quiet members are encouraged to contribute - Team members listen intently - Team members build on each other's ideas - The team works to create a common understanding - Comments are professional, clear, concise, and appropriate for the audience
2. Planning	- The team evaluates the task with time constraints in order to brainstorm possible strategies - The team has a developed a plan for the task at hand - The team keeps track of the ideas that are presented, discussed, and evaluated - The team has set project and/or interaction goals - The team assigns tasks and responsibilities to ensure that everyone makes equal contributions to the project
3. Critical Evaluation/ Negotiation	- The team considers multiple points of view from various members - The team engages in rich, productive argumentation - The team critiques ideas deeply and evaluates trade-offs of different ideas - The team ensures to critique ideas in a professional manner - The team takes all members into account when deciding which ideas/courses of action to take
4. Productivity	- The team consistently determines, records, and shares progress - The team rarely if ever displays off-task behaviors - The team works together to evaluate and improve work quality - The team consistently meets deadlines it sets - The team effectively implements "time-saving" strategies

Figure 1 - Four collaborative capacities

To support the semester-long projects and collaboration, we started to envision a system scaffolding this role. In the past, we have developed a system called BRIDGE (Ganoe, Somervell, Neale, Isenhour, Carroll, Rosson and McCrickards, 2003). It provides synchronous and asynchronous collaboration. BRIDGE hosts a large variety of objects, from HTML to drawing objects, and to calendar. However, the system is client-heavy with a Java client. The services are too advanced for students without adequate collaboration experience.

The workspace

We began to design and implement the workspace system in fall 2009. The high-level goal is to create a lightweight, web-based space where students can practice usability engineering knowledge and collaboration skills.

We constructed a set of first-order requirements and designed affordances (table 1). First, students should be able to practice knowledge they learned, with respect to the subject matters of the course. The system should provide support for students to learn and for instructors to deliver the intended knowledge. *Second*, problem-solving skills require teamwork, so students should be able to collaborate. *Third*, projects and assignments usually span more than one day and need considerable coordination. Coordination and proper level scaffolding of it is desired. Fourth, as we have found that the students sometimes show lack of reflection on their own thinking and learning process, it will be very helpful to aid their reflection throughout the activities. Fifth, the workspace should be a place where information can be gathered and shared.

Requirement	Description	Affordance
Practice knowledge	Apply and discuss knowledge learned	Authoring, Commenting tool
Collaboration	Use collaborative technology and share information sharing	Shared workspace and objects
Coordination & team process	Supporting team process	Meeting agenda, to-do list
Reflection & reasoning	Helping students reflect on what they learn and team processes	Commenting tool
Information management	Gathering and sharing information	Uploading files, tagging

Table 1 - Summary of requirements

The functions exposed to the students are a set of digital objects: collaborative documents, meeting agendas, a team to-do list, and file upload. Each team has a workspace. The instructor and the team can access the workspace. A workspace is organized as a tree of folders and objects. Students can create objects and upload external files into a workspace.

In 2010 spring, 8 teams worked with clients in the USA. These clients displayed great diversity (e.g., commercial companies, NGOs, research groups as well as ranging from local to 3 time zones away). Students had deliverables every two weeks. 8 teams created 3978 total objects.

Discussion

We found that the workspace is useful and has potential in engineering education and learning. We also observed issues regarding to the workspace use and collaboration among students. Students are familiar with web 2.0 technology. But they do not have enough knowledge for smooth and effective collaboration. We saw instances where students do not reflect on learning activities enough, and sometimes use concepts or instruments mechanically without adaption for their current context. Students made different use of the workspace. For some groups, they created and finished deliverables outside the workspace and then uploaded them. For other groups, they had intensive chat and created presentable objects within the workspace.

One effort we will undertake is to integrate different objects in the workspace. This will include object type-conversion. The students will be able to create a team to-do list from existing objects such as their meeting agendas or to create to-do items from selected chat messages.

Another effort is to integrate and make more use of time information. Many time-sensitive objects are supported, such as agenda items and to-dos. The system will detect time information from objects and provide awareness to teams (e.g., highlighting items due in the near future). We will plot group activity on a timeline (Ganoe et al 2003). This information will allow teams and instructors to monitor group activities. These improvements will help the workspace better serve collaborative processes of the student teams.

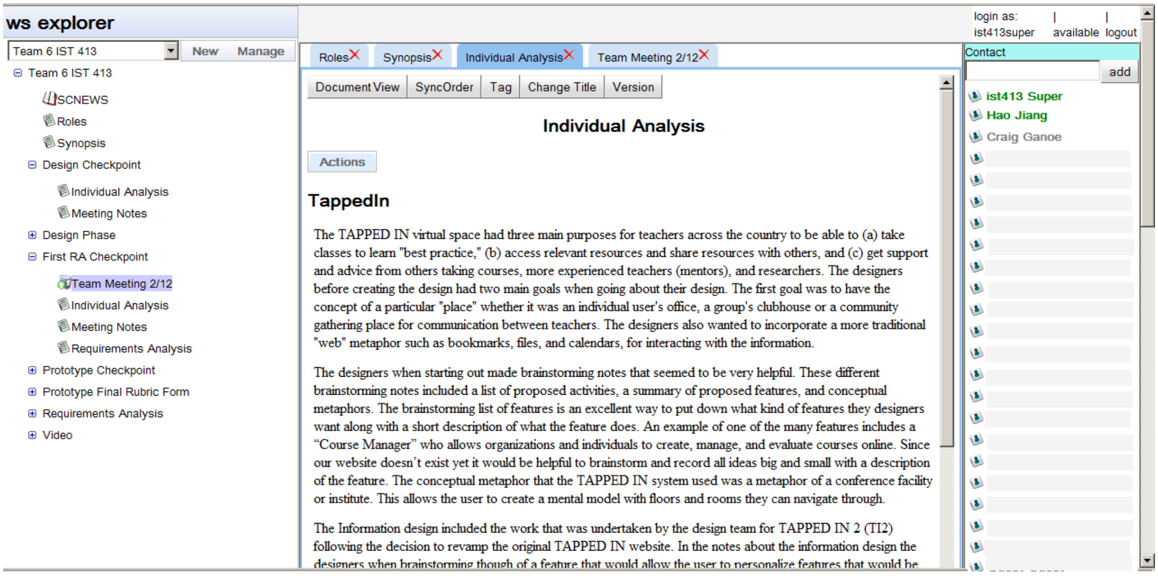


Figure 2 - Workspace example

References

Borge, M. (2007). Regulating social interactions: developing a functional theory of collaboration. Dissertation Abstracts International, 241.

Borge, M., Carroll, J. (2010). Using collaborative activity as a means to explore student performance and understanding. Presented at the International Conference of The Learning Sciences, Chicago, Il.

Carroll, J.M., Borge, M. Ganoe, C.H. & Jiang, H. 2010. Distributed collaborative homeworks: Learning activity management and technology support. IEEE EDUCON 2010. (Madrid, April 14-16). Pp. 1585-1594.

Ganoe, C.H., Somervell, J.P., Neale, D.C., Isenhour, P.L., Carroll, J.M., Rosson, M.B. & McCrickard, D.S. (2003). Classroom BRIDGE: using collaborative public and desktop timelines to support activity awareness. ACM UIST 2003. New York: ACM, pages 21-30.

Ganoe, C., Borge, M., Jiang, H., Carroll, M., and Rosson, MB. (2009) Usability Case Study Learning Objects for Collaborative Authentic Education. Learning Technology Newsletter, Volume 11 Issue 4 (http://www.ieeetclt.org/issues/october2009).

Hao Jiang
Pennsylvania State University, USA
hjiang@ist.psu.edu

Craig H. Ganoe
Pennsylvania State University, USA
cganoe@ist.psu.edu

Marcela Borge
Pennsylvania State University, USA
mbs15@psu.edu

John M. Carroll
Pennsylvania State University, USA
jcarroll@ist.psu.edu

Ishita Ghosh
Pennsylvania State University, USA
iug112@ist.psu.edu

Mary Beth Rosson
Pennsylvania State University, USA
mrosson@ist.psu.edu

Web 2.0 Tools for Collaborating in Language Education

There is growing interest in applying a socio-constructivist approach in language education. Masaki Kobayashi conducted a study that examined language socialization theory. Kobayashi cites Bernard Mohan, stating that language socialisation “is a major source for learning about and expressing what one must say, know, value, and do in order to participate in sociocultural situations of society (Mohan, 1987, cited by Kobayashi). Simina and Hamel state that when integrating a learner-centered, socio-constructivist approach within a Computer Assisted Language Learning (CALL) environment, the potential for successful acquisition of the target language is maximized (Simina, Hamel, 2005). This article attempts to demonstrate a collaborative approach combined with web 2.0 tools can greatly aid target language acquisition among learners.

Bernd Ruschoff discusses Technology Enhanced Language Learning (TELL) (Ruschoff, 1998). He states that “Education and teaching in the knowledge society can no longer be reduced to “the act, process, or art of imparting knowledge and skill” as Roget’s Thesaurus proposes, but learning must be recognised as an act in which a learner plays the role of an active constructor of knowledge” (Ruschoff, 1998). The four essential skills of language learning are listening, speaking, reading, and writing. PC Miller cites Phillips and Draper, who state that the four language skills are “developed interdependently” to ensure learners become competent communicators of the target language (Phillips & Draper, 1999, cited by Miller). By taking a constructivist approach, using web 2.0 tools, students can work together, improving their communicative competencies in these four areas.

Richards refers to an activity supported by technology as an “activity-reflection cycle” (Richards, 2004) whereby the learner is engaged in “application and interaction”. He concludes that technologies used in teaching and learning need to “be grounded in activity as both process and structure.” (Richards, 2004) Internet provides the language learner with a wealth of resources for applying knowledge and interacting with others. Blogs, wikis, and social networks such as Twitter and Facebook bring learners together to communicate through text, improving their reading and writing skills. Voice and video chat tools such as Skype and Google Voice Chat enable one-to-one interactions between both student and teacher as well as between students, ensuring students feel comfortable with practising their oral skills.

Thoms, Liao, and Szutak (2005) conducted a study of university students collaborating via on-line chat on a jigsaw activity using L1 (their native language) to move along the activity to be completed in L2 (the target language). Brooks (1992) was cited having discovered that when using L1 while interacting, “learners strengthen their strategic competence” and promotes “inter-subjectivity” while collaborating within a group (Brooks, 1992, cited by Thoms, Liao, & Szutak, 2005). They also found that activities involving collaboration effect L2 competency in grammatical skills.

Learners can either collaborate synchronously (chat rooms, Skype) or asynchronously (discussion board, Google Wave), having more flexibility in choosing how and when to interact with others. Synchronous learning environments are beneficial when wanting to practice language skills through conversation with other learners. Asynchronous learning environments can be advantageous for language learners from different parts of the world who cannot join live discussions due to time zone differences. Asynchronous learning environments also are appealing to learners wanting to carefully revise their written communication for grammar, spelling, and accord prior to sending.

Language Quests are web quests that help learners improve their language skills. The European-based network site called “Language Quest” (http://lquest.net) provides registered users with access to language web quests in various target languages. Language quests can be particularly useful when teaching from a project- or task-based approach, encouraging students to work collaboratively. Virtual worlds such as SecondLife can serve as an effective space for conducting a language quest. Howard Vickers found that virtual worlds offer three forms of learning experiences: “social experiences, immersive experiences and creative activities” (Vickers, 2010). Learners can collaborate with others in a highly realistic environment through the target language whilst constructing knowledge of language and culture.

Learners who are engaged in a project-based learning approach will also find a wiki useful as a tool for collaborating and drafting work on the internet with peers. According to Bob Godwin-Jones, wikis can be defined as “intensely collaborative” (Godwin-Jones, 2003). He elaborates that wikis are comprised of an “open-editing system”, allowing multiple users to modify, add, or remove content on any of the wiki's pages.

To conclude, web 2.0 tools can be used successfully in a socio-constructivist and communicative approach towards acquiring a new language. These tools give learners increased flexibility in how and when they learn with others. Asynchronous and synchronous learning provides learners with increased possibilities to collaborate with learners across the globe. Use of written and verbal communication can greatly aid learners in acquiring the target language.

References

Godwin-Jones, B. (2003). Blogs and Wikis: Environments for On-line Collaboration. Language Learning & Technology. Vol. 7, No. 2, pp. 12–16.

Kobayashi, M. (2006). Second Language Socialization Through an Oral Project Presentation. In Beckett, G.H., & Miller, P.C.(2006). Project-Based Second and Foreign Language Education: Past, Present, and Future. Greenwich, CT: Information Age Publishing Inc.71-93.

Miller, P.C. (2006). Integrating Second Language Standards Into Project-Based Instruction. In Beckett, G.H., & Miller, P.C.(2006). Project-Based Second and Foreign Language Education: Past, Present, and Future. Greenwich, CT: Information Age Publishing Inc. 225-240.

Richards, C. (2005). The Design of Effective Supported Learning Activities: Exemplary Models, Changing Requirements, And New Possibilities. Language Learning & Technology, 9(1), 60-79.

Ruschoff, B. (1998) New Technologies and language learning: theoretical considerations and practical solutions. University of Essen, Germany.

Simina V. & Hamel, M.J. (2005). CASLA through a social constructivist perspective: Web Quest in project-driven language learning. ReCALL, 17 (2), 217-228.

Thoms, J., Liao, J., & Szustak, A. (2005). The use of L1 in an L2 on-line chat activity. Canadian Modern Language Review, 62(1), 161-182.

Vickers, H. (2010). VirtualQuests: Dialogic Language Learning with 3D Virtual Worlds. CORRELL: Computer Resources for Language Learning 3, 75-81.

Bernadette Rego
University of British Columbia
Canada
regob@interchange.ubc.ca

Collaborative learning through advanced Web2.0 practices

Introduction

Latest advances in ICT have started impacting also the field of education and training. Social computing and Web2.0 technologies have brought vigorous opportunities for learning and have realised a shift of the web's role in learning from an information carrier to a facilitator for the creation and distribution of collective knowledge [1]. Technological advances have enhanced the potential of collaborative learning and peer-learning, where students can become more active participants and co-producers of knowledge, thereby allowing for more horizontal educational structures and contexts.

The main objective behind the work presented in this article is to investigate the potential of Web2.0 technologies for supporting innovative pedagogies such as collaborative learning and Problem-Based Learning (PBL) [2]. In this article we present: (a) what PBL is and the implications in relation to course development and (b) how Web2.0 technologies may be used in this context. The article concludes with the presentation of a collaborative learning platform developed to underpin our results and a short reference to further work.

PBL and Web2.0 in learning

Problem-based learning is a student-centred pedagogy focusing on students' active and often collaborative production of knowledge through engaging with real world problems/cases. Although there are differences in how PBL is carried out in practice, one can also find some general traits; i.e. that problems are the starting point for the learning process; that students should build on their own experiences and learn through active engagement with real-world problems/cases, which involve research and empirical activities often in collaboration with peers. Numerous PBL scenarios may be developed for different settings. However, the central aspect is how power is distributed between teachers and students across three dimensions: the problem, the work process, and the solution. Reflecting on these different aspects can support teachers/course-designers in developing PBL practices which are congruent with new learning practices and institutional demands.

Some of the core concepts associated with Web2.0, such as collaboration, participation and sharing, are well aligned with PBL. In our working context we find it useful to distinguish between Web2.0 as a range of technologies (e.g. blogs, podcasts, wikis) and Web2.0 as particular practices (e.g. blogging, podcasting, collaborative writing). We emphasise this distinction because employing a Web2.0 technology does not necessarily entail pedagogically innovative Web2.0 practices. For example, a teacher may create a blog and then use it only to disseminate information to students, not allowing them to write or comment. Therefore, Web2.0 learning is not only about using particular technologies, but equally about the degree to which teachers adopt more student-centred, participatory or collaborative practices.

Web2.0 collaborative learning

Therefore, new tensions and challenges arise. Particularly questions concerning power distribution between students and teachers become pertinent when combining student-centred pedagogies and Web2.0 learning practices. We have mapped such tensions across four central dimensions, which practitioners can use to reflect on their design and values (Figure 1). This can provoke questions in relation to who controls the learning process flow, e.g. should students be self-directed learners, who decides which Web2.0 tools/practices to use, etc.? Reflecting and deciding on such issues of control is increasingly important when adopting student-centred pedagogies and Web2.0 practices, which are more often employed in informal learning settings, in intra-organisational training or for purely social purposes.

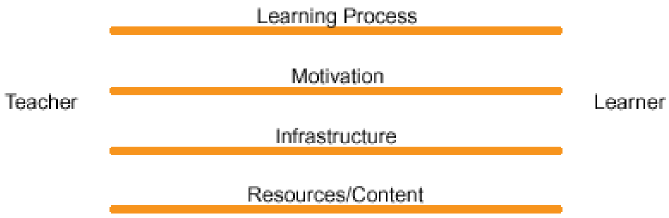


Figure 1 - Web2.0 learning tensions between teacher and learner

Questions similar to the aforementioned ones are to be addressed when designing Web2.0 learning environments; and different answers may be given depending on the different learning settings and goals. For our Web2.0 learning platform we targeted at enhanced collaboration opportunities and flexibility at the teacher-learner continua. Consequently, the platform supports different models of collaborative learning to be utilised in the different learning settings of our pilots. The main aims while designing the learning platform are to:

- provide easy-to-use tools,
- enable and encourage collaboration,
- organise information in an easy and predictable way imposing minimal cognitive load on users.

To address these aims, we adopted the following approaches:

1. Use of popular Web2.0 tools, e.g. blog, wiki, forum.
2. Integration of existing standards, e.g. SCORM.
3. Organisation of resources, primarily based on tags.
4. Hierarchical division of spaces and content-filtering based on role, i.e. Class Desk, Group Desk, My Desk.
5. Back office facility to support facilitator/teacher role.
6. All content can be commented on, rated, discussed and tagged to enable better collaboration.

Application to a specific case

The aforementioned learning approaches are particularly relevant to lifelong training on multidisciplinary topics, such as Enterprise Architecture (EA), which is gaining increased recognition worldwide. EA is a topic in need of deep and diverse background competencies (technical, business, organisation-specific) that are often acquired within the organisational context. EA is therefore suitable to be taught in a collaborative organisational context utilising PBL approaches. Consequently, EA is the topic selected for piloting the presented work within the context of the EA Training 2.0 project. So far, the first pilot for undergraduate students is completed in Greece; pilots in Germany, Austria and Poland follow, targeting postgraduate students, private and public sector employees respectively. All pilots utilise the presented Web2.0 platform although according to different learning approaches; University pilots are closer to the traditional lecturing model with the platform as a supporting tool, the public sector pilot is offered completely online, and the private sector pilot utilises both elearning and mentoring practices.

Acknowledgement

The work reported is part of the EA Training 2.0 project (www.eatraining.eu) which is co-funded by the European Commission under the Lifelong Learning Programme.

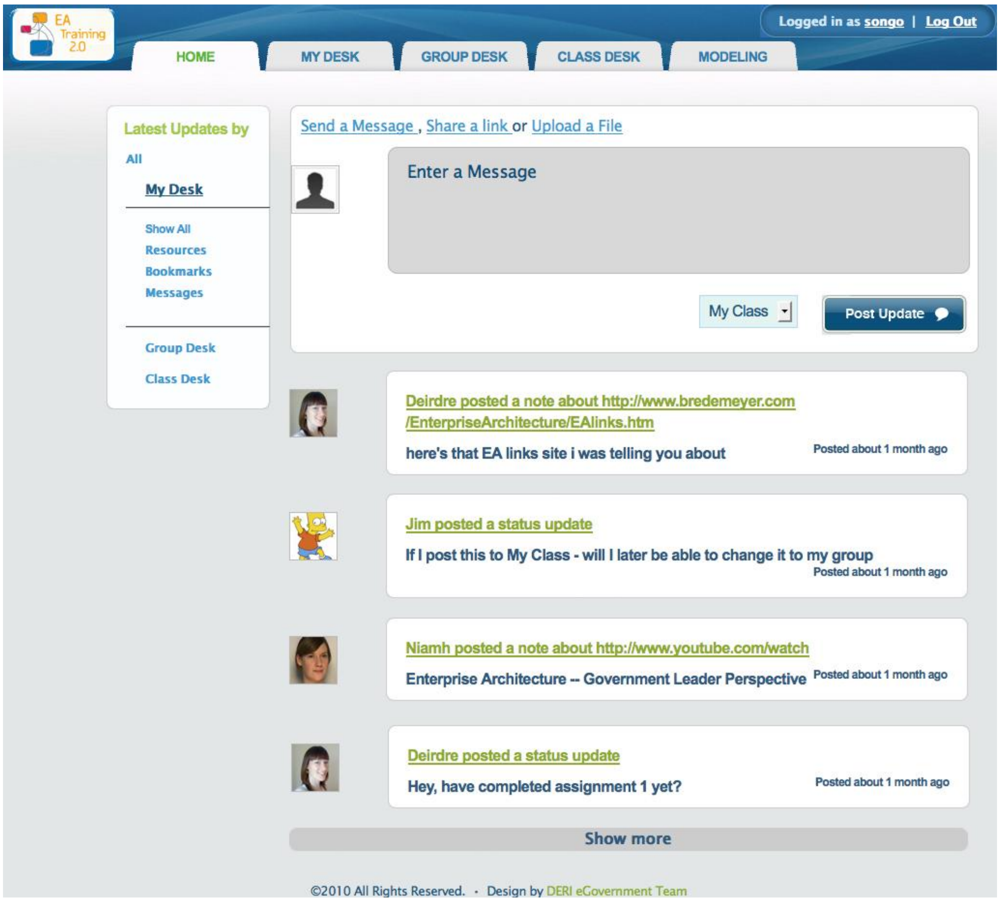


Figure 2 - Platform home page

References

Maloney Edward J. (2007) "What Web 2.0 Can Teach Us About Learning". The Chronicle of Higher Education. http://chronicle.com/article/What-Web-20-Can-Teach-Us/8332, accessed 21 June 2010

Glud, L. N., Buus, L., Ryberg, T., Georgsen, M., & Davidsen, J. (2010) "Contributing to a Learning Methodology for Web 2.0 Learning – Identifying Central Tensions in Educational Use of Web 2.0 Technologies". In L. Dirckinck-Holmfeld, V. Hodgson, C. Jones, M. de Laat, D. McConnell, & T. Ryberg (Eds.), Proceedings of the 7th International Conference on Networked Learning, Networked Learning (pp.934-942). Aalborg

Efthimios Tambouris
University of Macedonia, Greece
tambouris@uom.gr

Eleni Panopoulou
University of Macedonia, Greece
epanopou@uom.gr

Konstantinos Tarabanis
University of Macedonia, Greece
kat@uom.gr

Thomas Ryberg
Aalborg University, Denmark
ryberg@hum.aau.dk

Lillian Buus
Aalborg University, Denmark
lillian@hum.aau.dk

Vassilios Peristeras
Digital Enterprise Research Institute
Galway, Ireland
Greek National Centre for Public Administration and Local Government
Athens, Greece
vassilios.peristeras@deri.org

An Innovative Group Formation Approach for Collaborative Learning

Introduction

Collaborative learning is based on sociological and psychological approaches that emphasize how students can learn together and develop interpersonal relationships via interaction with peers [5]. However, one obstacle to achieving this is the difficulty instructors face in placing students into appropriate groups to make the best use of collaborative learning. In very small classes, it is easy for instructors to form groups; however, there are often many students in a computer-supported collaborative learning environment, making group formation is a time-consuming process.

Several studies have demonstrated that criteria for group formation affect the learning performance and social behavior of students [1], [7]. In this study, students' prior knowledge level is used as the criterion for forming collaborative learning groups. Prior knowledge is an essential framework for learning new knowledge since it affects learners who interpret, organize, assimilate, and absorb new instructions [6]. Several studies have found that learners achieve better learning comprehension and performance when they have better prior knowledge in the learning context [2], [4].

This study models the group formation problem based on students' prior knowledge level and applies particle swarm optimization (PSO) to address the optimization problem [3].

Particle swarm optimization for group formation problem

To form collaborative learning groups, two grouping criteria are designed based on the prior knowledge level of students. Generally, the prior knowledge levels of students for each topic can be measured by an assessment. The formal definition of the first grouping criterion is:

$$f_1 = \frac{\sum_{l=1}^{k} \left\{ \sum_{j=1}^{r} \left[\frac{\sum_{i=1}^{n} \left(\left| L_{ijl} - \frac{\sum_{x=1}^{n} p_{jx} L_{xjl}}{\sum_{x=1}^{n} p_{jx}} \right| \right)}{\sum_{x=1}^{n} p_{jx}} \right] \Big/ r \right\}}{k}$$

where f_1 uses the prior knowledge levels of n students for k topics to measure the average difference of prior knowledge levels for k topics within each group. L_{xjl} represents the prior knowledge level of the l^{th} topic of the x^{th} participating student in the j^{th} group $1 \le j \le r$ $1 \le j \le r$. p_{jx} is the x^{th} participating student in the j^{th} group. n is the number of participating students, r is the number of groups, and k is the number of topics. The formal definition of the second grouping criterion is:

$$f_2 = \frac{\sum_{l=1}^{k} \left\{ \sum_{i=1}^{r} \left\{ \frac{\sum_{x=1}^{n} \left(p_{ix} L_{xil} \right)}{\sum_{x=1}^{n} p_{ix}} - \left[\frac{\sum_{j=1}^{r} \left(\frac{\sum_{x=1}^{n} p_{jx} L_{xjl}}{\sum_{x=1}^{n} p_{jx}} \right)}{r} \right] \right\} \Big/ r \right\}}{k}$$

where f_2 uses the prior knowledge levels of n students for k topics to measure the average difference of prior knowledge levels for k topics between r groups. The other variables are as defined above.

Furthermore, the encoding rule of PSO is modified to $P_y=[p_{11}\ p_{12} \ldots p_{1n}\ p_{21} \ldots p_{2n} \ldots p_{jn} \ldots\ p_{rn}]$, where P_y is the y^{th} particle, and the particle uses $r \times n$ bits to represent that a group can be formed from the n participating students. Based on these, the formal definition of the fitness function for the PSO is:

$$\textit{Minimize} \quad Z\left(P_y\right) = \left(1 - f_1\right) + f_2$$

The fitness function is to find an optimal solution that will maximize the difference of the prior knowledge level between members in each group and minimize the difference of the prior knowledge level between groups.

Additionally, a logistic transformation, sigmoid function S(·), is used as the velocity function to update the position of each particle.

$$S\left(v_{y,i}\right) = \frac{1}{1 + e^{-v_{y,i}}}$$

The sigmoid function is used as a probability scale with a range of [0.0, 1.0] to determine which particle bits have a value of 1.

The proposed approach has the following six steps.

Step 1. Generation of initial swarm.

Initially, the approach adopted random-selection strategy to decide who (which) students (bits) are selected and set the state to value 1 in each particle.

Step 2. Fitness evaluation of particles.

The approach measures the quality of each particle based on the fitness function and then administers the next step to guarantee the quality of each particle.

Step 3. Determining the best fitness values of individual and global particles.

Each particle compares the present fitness value with the individual best value obtained in the past generations to determine which one is better. If the present value is better, the individual best value will be replaced by the present one and vice versa. Additionally, the global best value is found among all particles in the swarm.

Step 4. Updating the position of each particle.

The updating of the velocities and particle positions is based on the velocity function of the PSO.

Step 5. Determination of termination.

This step is to determine whether this procedure can be terminated, and if not then it goes back to the second step in phase 2 and repeats these steps until termination can be achieved.

Step 6. Group formation result generation.

This step is to show the group formation results to instructors. If the instructors are unsatisfied with the results, then they can require the PSO to form groups again.

Conclusion

This study applied PSO to model a group formation problem. The approach allows educators to form collaborative learning groups based on the prior knowledge level of each student. Educators can thus design appropriate assignments to promote a high level of learning and interaction within a group. A series of experiments will be conducted in the future to evaluate the efficacy of the approach.

Acknowledgements

This work was supported in part by the National Science Council (NSC), Taiwan, ROC, under grants NSC 98-2631-S-006-001, NSC 97-2511-S-006-001-MY3, and NSC 98-2631-S-024-001.

References

[1] Beane, W. E. & Lemke, E. A. (1971). Group variables influencing the transfer of conceptual behavior. *Journal of Educational Psychology*, 62(3), 215-218.

[2] Jong, T. D. & Joolingen, W. R. V. (1998). Scientific Discovery Learning with Computer Simulations of Conceptual Domains. *Review of Educational Research*, 68(2), 179-201.

[3] Kennedy, J. & Eberhart, R.C. (1995). Particle swarm optimization, *In Proceedings of the IEEE international conference on neural networks* (pp. 1942–1948). Perth, Australia: IEEE Service Center.

[4] Moreno, R. (2004). Decreasing Cognitive Load for Novice Students: Effects of Explanatory versus Corrective Feedback in Discovery-Based Multimedia. *Instructional Science*, 32(1-2), 99-113.

[5] Stahl, G. (2005). Group cognition in computer-assisted collaborative learning. *Journal of Computer Assisted Learning*, 21(2), 79-90.

[6] Yates, G. & Chandler, M. (1994). Prior Knowledge. *SET: Research Information for Teachers*, 2, Item 6.
[7] Zurita, G., Nussbaum, M., & Salinas, R. (2005). Dynamic grouping in collaborative learning supported by wireless handhelds. *Journal of Educational Technology & Society*, 8(3), 149-161 [Special Issue on Authoring of Adaptive Hypermedia].

Yen-Ting Lin
National Cheng Kung University, Taiwan
ricky014@gmail.com

Yi-Chun Lin
National Cheng Kung University, Taiwan
jellyplum@gmail.com

Yueh-Min Huang
National Cheng Kung University, Taiwan
huang@mail.ncku.edu.tw

Learning to integrate knowledge: experiences with public wikis in academic seminars

Introduction

Knowledge production is a core process in modern society and economy. Gibbons et al. [1] describe two different modes of knowledge production. While mode 1 clearly separates the scientific sphere from the other societal spheres, mode 2 emphasizes the importance of these being intertwined. According to mode 2, multiple connections between scientists and practitioners are a major source for creating knowledge. Consequently, learning can generally be considered to be a “process of creating networks” [2]. These establish

- intra-disciplinary linkages between scientists (same domain)
- inter-disciplinary linkages between scientists (different domains), and
- trans-disciplinary linkages between scientists and practitioners.

Learning networks facilitate the integration and recombination of knowledge which form the basis for knowledge creation.

Description

Our goal is to incorporate this notion of learning in academic seminars using a free public wiki [3], see http://de.wikiversity.org/wiki/Kurs:Teams_SoSe10. Students from different fields are prompted to write their papers in groups of up to four persons, thus fostering the intra- and inter-disciplinary exchange of ideas in teams. Furthermore, we explicitly encourage outsiders to give hints regarding literature or, at best, to discuss the subject and to produce new ideas by introducing their expertise or practical experience.

Concurrently, we offer a course which deals with basic knowledge and methods related to the process of writing scientific papers. Students taking part in the seminar described above are encouraged to attend this course, as well as other students preparing a term paper, bachelor or master thesis. We invite them to present the current status of their work, e.g. the structure of their paper or the outline of their argumentation. This will then be discussed and reviewed by the other students always trying to develop and apply the basic rules of scientific work. In this integrative learning context, the wiki has proved to be a very helpful tool making the preliminary work results of a student accessible for the others. This allows them to give feedback and to make suggestions for improvement, on-line as well as off-line (during the course).

Discussion

Even without participation from outside the university, groups of students can benefit from using a wiki since they do not have to worry about spreading updates of the text or about backups of previous versions. In addition, they can acquaint themselves with working in Web 2.0. If outsiders join in, they can enrich the papers by supporting new perspectives and real-life relevance. In our first run, external input was scarce but appreciated by the students. Furthermore, this outside involvement can motivate them because they realize that others are interested in their efforts and that they do not only write for their tutors. Those, in turn, gain the option not only to review the final paper but the whole process of creation within the wiki. If they notice severe problems, they can intervene at an early stage.

Additionally, seminar students can benefit from the discussions and recommendations given by participants of the course about scientific work as explained above. In return, the latter obtain "training material" that they can apply the scientific principles to which are taught in their course. This is a substantial advantage since our experience from previous courses shows that most students from conventional seminars were not prepared to deliver insight into their work, either because they were not willing to do so or simply because they did not bring their papers to the course.

One of the counter-arguments against using a wiki might be that students and tutors must learn its special syntax if no graphical user interface is featured. In fact, this did not occur to be a problem. Although only three of the thirteen participants of our seminar stated that they had been actively working with wikis before, a very brief introduction was sufficient: the students were able to learn the markup language autodidactically and the majority thinks wikis are useful for collaboratively writing papers.

One more critical issue may be the expenditure of time for tutors, if they want to monitor the students' activity within the wiki. Essentially, it seems unlikely that someone can keep track of all changes made and know the status of all papers at all times, but the tutor can flexibly peek at the theses when his schedule allows to, and he can use the wiki to only display the differences between two particular versions to show the progress made since the previous review.

The most critical issue to keep in mind may be plagiarism which can happen either way, in a wiki or on paper. Considering the former, it is very likely that there is a larger inhibition threshold: who would like to be caught cheating in public? Additionally, revealing misbehavior would be easier because the data are stored digitally for further processing. In a nutshell: during our reviews, we did not detect any plagiarism.

Finally, one may fear that the papers will lack the personal contributions of the students since others are invited to discuss with them and to give suggestions. But, ultimately, someone has to write the theses and if someone else did, you would not be worse off than with a printed version - quite the contrary, with a wiki, tutors have more means for discovering fraud.

Conclusion

Public seminars cannot only deepen knowledge related to specific fields but also foster skills required in information society, e.g. communicating with others and working in teams. Public wikis are not only adequate tools for collaborating more efficiently but also for involving a wide range of different people - always allowing outsiders, ideally practitioners, to participate in joint knowledge construction.

References

[1] Gibbons, M.; Limoges, C.; Nowotny, H.; Schwartzman, S.; Scott, P.; Trow, M.: The new production of knowledge. Sage, London, 2009.
[2] Siemens, G.: Knowing Knowledge. lulu.com, Winnipeg, 2006.
[3] Spannagel, C.; Schimpf, F.: Öffentliche Seminare im Web 2.0. In (Schwill, A.; Apostolopoulos, N.; eds.): Lernen im Digitalen Zeitalter – Workshop-Band: Dokumentation der Pre-Conference zur DeLFI2009. Logos, Berlin, 2009; pp. 13-20.

Oliver Tacke
Technische Universität Braunschweig, Germany
o.tacke@tu-braunschweig.de

Björn Hobus
Technische Universität Braunschweig, Germany
b.hobus@tu-braunschweig.de

Case study examples of MediaWiki in teaching and learning

Introduction

Internet based Wikis provide a ubiquitous way for teaching and learning content to be created managed and distributed. Content can be created by a lead person (such as a Lecturer), and can be added to, and amended by both the creator and learners based on their research or prior knowledge.

MediaWiki is the software used by Wikipedia, the largest encyclopedia in existence (Gabrilovich & Markovitch, 2007), and has been adopted by two significant collaborative Learning content repositories: WikiEducator (http://www.wikieducator.org) and WikiVersity (http://www.wikiversity.org).

For the research being conducted the overall research question is “Can a wiki be used to effectively deliver content in a blended learning environment?” This is the part of a major action research project spanning many years, and this cycle considers the use of wikis as a delivery tool in the virtualMe framework. For more detail please refer to Verhaart (2008; 2009).

From an educator’s perspective, are there examples of how WikiMedia can be used to facilitate both teaching and learning, and what technology is required to allow the content to be presented? The overall purpose of this paper is to generate interest in sourcing good exemplars that will form a resource for those wishing to use wikis for learning.

MediaWiki in Teaching and Learning

In order to investigate how wikis (and in particular MediaWiki) can be applied, MediaWiki has been used in a blended teaching and learning environment. So as not to be constrained by the limitations of existing systems (such as wikiEducator & WikiVersity), a MediaWiki has been privately hosted at http://www.virtualmv.com/wiki. This has allowed for research into what additions could be added enhancing learning based content.

In a blended learning situation, multiple pedagogies can be employed. At the 2010 DEANZ Conference, in Wellington, New Zealand, Terry Anderson described three generations of distance education pedagogy. These included: behaviourist/cognitive, constructivist and connectivist. (Anderson, 2010), where: behaviourist/cognitive includes, self paced and individual study (and in a blended environment instructivist; constructivist, working in groups; and connectivist, using networks and collectives. For a blended environment, multiple strategies are used to engage students, with different pedagogies suiting different situations. Therefore, in order to be useful in a blended teaching and learning environment ideally multiple pedagogies should be supported.

Content presentation and technology support for learning

Developing learning content and materials in MediaWiki has two lenses: The first involves the way in which the content is to be delivered to learners, and the second what technology is required. The MediaWiki case study being explored centres on content in the Multimedia, and Internet domains for undergraduate students. At this stage, several learning paradigms have been prototyped and used in teaching situations and include:

- Presentation – Content is presented either as a lecture or as supporting material.
- Video Tutorials.
- Activity - Content presented where students are expected to do a task.
- Research/Referencing – where content is set out in a way that exemplifies good citing and referencing.
- Question and Answering: Providing the ability for either providing “hidden” answers, or quizzes, such as multi-choice tests that can be marked by the computer.
- Discussion– where students can collaborate using social media such as Twitter or discussion threads.
- Enhanced content – displaying computer source code with significant features (such as key-words) highlighted.
- Connected media – Using external media (may be shared collaboratively – like Google docs).
- Interactive – where learners interact with the content – in the protype enter some HTML code and it is displayed on the wiki page. This would also include Flash based or JavaScript tutorials.

Many of these are illustrated in Figure 1.

Figure 1 - Sample wiki page showing Twitter feed, Google Docs, Wiki links, Referencing and discussion thread

In order to facilitate these situations, MediaWiki has been extended. From the case study five ways to extend MediaWiki were identified:

1. Adding JavaScript that would be loaded with every page.
2. Developing Templates that would automate functionality such as providing pedagogical templates (for objectives, questions, etc.), and referencing.
3. Adding full (PHP) extensions to Mediawiki.
4. Adding Widget extensions to Media Wiki .

5. Using tools external to MediaWiki, such as Mark Russinovich's Zoom-it (Russinovich, 2009).

Wiki grids

Two wiki grids have been constructed to help this research. The first "MediaWiki:Teaching and Learning Examples" and the second "MediaWiki:Extending for Teaching and Learning", both can be accessed via http://www.virtualmv.com/wiki/index.php?title=Research:Wiki.

In the first case examples are mainly taken from the research wiki (virtualMVwiki), though it is hoped that over time this will include more examples from the publically generated wikis (WikiVersity and WikiEducator). An excerpt from the grid is shown in Table 1.

Type	Wiki	Add-ins	Description/URL
Q&A	vMV	js:CT	JavaScript:Interactive Help Desk: Problems are stated, the answers are hidden. Interactive Help Desk
Q&A	WE	js:CT	Álgebra - Polinomios - Factorización. Práctica Uno: Multi-choice questions are presented. Each answer contains a drop down to show whether the answer is correct or not http://wikieducator.org/Matematicas_GECeneval286/Algebra/Polinomios/Factorizacion/Practica_1
Presentation	vMV	tm:PO	TeachLearn:Virtual Presence for T&L: A presentatio showing the use of Pedagogical templates for objectives, keypoints, and questions Virtual Presence for Teaching and Learning

Table 1 - Table of teaching and learning examples

The second table identifies the extensions to MediaWiki to enable the learning material to be constructed. An excerpt from the grid is shown in Table 2.

Type	Description	virtualMV-wiki	Wiki-Educator	Wiki-versity	Wiki-pedia
js:CT	Collapsible Tables: Gives the ability to hide the body of a table.	Y 1	Y 1	?	?
tm:FR	Footnote reference: Provides a citable reference for the page and creates a zotero (COinS) record	Y$	N	N	N
ex:DIS	Discussion: allows discussion threads to be added to each page, and via Special:RecentComments see a full list of comments	Y list	?	?	?
wi:GD	Google docs: Displays a google document (e.g Presentation).	Y 1	N	?	?
ot:ZIT	ZoomIt (Russinovich, 2009)[2]: Allows you to zoom into a page and annotate when presenting.	.	.	.	.

Table 2 - Table of teaching and learning extensions

Results/Benefits

The actual case study has been evolving since July 2008 and has been deployed in a blended teaching environment. From a lecturer view the wiki has proved a suitable tool for delivering a wide variety of content in different modes (lecture, practical, etc.), and feedback from students has been very positive. Formal research into student perceptions and experiences is to be conducted.

Ongoing, Future work and Conclusion

The work presented into using MediaWiki in teaching and learning is ongoing and many research paths are presenting themselves. It is hoped that this paper will encourage readers to look into the MediaWiki based teaching and learning systems and find good exemplars for others to base teaching content on. Indeed readers are invited to participate in this research and contribute to the wikipages identified.

References

Anderson, T. (2010) Three Generations of Distance Education Pedagogy [PowerPoint]. Retrieved May 2, 2010 from http://cider.athabascau.ca/CIDERSessions/sessionarchive/

Gabrilovich, E. & Markovitch, S. (2007) Computing Semantic Relatedness using Wikipedia-based Explicit Semantic Analysis., International Joint Conference on Artificial Intelligence, Hyderabad, India, January 6-12. pp 1606-1611

Russinovich, M. (2009). ZoomIt v.1. In *Microsoft TechNet*. Retrieved June 6, 2010 from http://technet.microsoft.com/en-us/sysinternals/bb897434.aspx

Verhaart, M. (2008). *The virtualMe: A knowledge acquisition framework*. Unpublished PhD thesis. Massey University, Palmerston North, New Zealand., Retrieved from http://muir.massey.ac.nz/handle/10179/851

Verhaart, M. (2009). Personal Web based knowledge management: The virtualMe framework. VDM Verlag.ISBN: 978-3-639-16525-8

Michael Verhaart
Eastern Institute of Technology
Hawke's Bay, New Zealand
mverhaart@eit.ac.nz

Regular Articles Section

Our World is About to Change: The Product Life Cycle and Online Education

Over the past decade online education has experienced an incredible, meteoric rise as a product and an industry. Correspondence education has existed for generations but online education as its own entity is much younger. While there may be different arguments as to when online education really began one milestone is the formation of the first accredited online university, cited by the United States Distance Learning Association as Jones International University in 1993. Using this date, today in 2010 online education is only 17 years old; yet it is highly visible to academics in new online initiatives and to the general public through pervasive advertisements from for-profit online education providers.

Yahoo Finance lists the market cap, the current trading value of stocks, for the training and education industry at US$36 billion at the time of this writing. While the industry does include some companies that do not operate online and others that operate both online and on-ground much of this $36 billion is made up of online education programs. Appollo Group, who owns the University of Phoenix, has a market cap of US$7.8 billion, Strayer Education US$3.4 billion, Education Management Corporation that includes Argosy University US$3 billion, and Grand Canyon University with US$1.12 billion. These figures represent only the publicly traded for-profit online education providers and as such do not reflect the full value of the industry that also includes privately held for-profit and both public and private non-profit providers.

The billions of dollars of value in the online education market can help to clarify the magnitude of what is involved in working in this industry. The very rise of the industry, the speed and relative ease with which so many providers have become successful, makes the job of succeeding in online education appear much easier than it actually is in today's environment. Industries operate on a life cycle, a series of four stages through which most companies and industries progress. The life cycle stage in which companies are operating can be indicative of an organization's strategic environment.

These four stages are introduction, growth, maturity, and decline (Lake, 2003). Briefly, the introduction stage is a new product that is finding its way into the market and is often purchased only by early adopters. The growth phase is a period during which the product finds broad acceptance and many new providers enter the market and find success. In the maturity stage demand and sales of the product may continue to grow, but competition among competitors increases and successful providers begin to establish dominance in the market. In decline, consumers stop purchasing the product and providers exit the market.

Online education today has entered the early maturity stage. In this stage online education can certainly continue to expand, and many more students may pursue online education opportunities, but the competitive market for providers of online education will see substantial change. There are several key facts that indicate this shift in life-cycle stage.

One of the key indicators of a mature stage in the life cycle is the establishment of dominant providers in the marketplace. Online education is experiencing this shift today, with 75% of online courses currently being offered by just 1/3 of online providers (Allen & Seaman, 2007). Mayadas, Bourne, and Bosch (2009) further explain that the majority of online enrollments are in traditional institutions and those enrollments are leveling off. The growing dominance of a minority percentage of providers and slowing growth in new enrollments will change the competitive environment in online education. Contrast these findings of 2007 and 2009 with the market in 1998, when Hanna explained that online education demand exceeded supply and that the rapidly developing market saw many new entrants trying to find the correct practices. In just a decade the market has changed from very open to more controlled.

Going forward participants in the online education industry will likely see increased competition and also increased barriers to entry for new competitors. The details of these changes will be seen as the industry moves forward, but what is important for everyone involved in online education to recognize is that change is coming. Competition among online providers will drive changes in the way online education operates, perhaps driving new initiatives for quality of online programs, perhaps driving cost competition that makes education more affordable, or in the most unfortunate circumstance perhaps driving quality down to make the system faster and easier.

The ultimate direction of these changes will be driven by multiple forces. Consumer demand, what students want and are willing to accept, will be one major force. Online providers, both administrators and faculty, will be another. As participants in the process faculty members and those responsible for the administration of programs will need to be aware of these pending changes to the market and plan for how individual programs will respond. In such a dynamic environment the successful programs will most likely be the most proactive.

Regardless of what happens, or how it happens, online education remains a powerful force in the educational world and is likely to continue growing in both size and influence. What it ultimately becomes is up to everyone involved in the process. Entering this maturity stage in the product life cycle everyone involved in online education will soon see changes. Plan, project, and be proactive.

References

Allen, I. and Seaman, J. (2007). Online Nation: Five Years of Growth in Online Learning. Needham, MA. Sloan Consortium.

Hanna, D. (1998). Higher Education in an Era of Digital Competition: Emerging Organizational Models. Journal of Asynchronous Learning Networks. 2(1). pp 66-95.

Lake, L. (2003). Product Life Cycle. Retrieved February 8, 2010, from: http://marketing.about.com/od/marketingglossary/g/prodlifedef.htm.

Mayadas, A., Bourne, J., and Bacsich, P. (2009). Online Education Today. Science 2. 323 (5910). DOI: 10.1126/science.1168874.

Jason G. Caudill
Carson-Newman College
Jefferson City, TN, USA
jason.caudill@gmail.com

Bridging Intellectual and Technological Innovations: The Collaborative Culture of Assessment

As the drive for accountability in higher education continues, it is essential to establish an assessment system that produces high-quality, valid measures of learner achievement that are transparent to learners, faculty, and external stakeholders (Skeele, Carr, Martinelli, & Sardone, 2007). Providing this type of assessment system through a collaborative model has introduced the need for a defined intellectual infrastructure, and a sound technological system endorsed by internal stakeholders at Capella. In response to the challenges posed by seeking full participation in generating this model, several tools have been developed to support the intellectual and technological infrastructure of the assessment system.

Description of Innovations and Implementation

Through the collaboration of faculty and staff, and their use of intellectual tools, including *Frame of Reference, Moderation Sessions,* and *Misalignment Taxonomy*, along with the technological tools generated from additional collaboration, it is expected that an assessment system that includes the integral pieces of quality, validity, and transparency will be available for the purposes of accurate measurement of learner achievement and program effectiveness.

Frame of Reference

To ensure that assessments are aligned with the stated program outcomes of the curriculum, faculty chairs are building an explicit model for each of their programs' outcome statements, referred to as a Frame of Reference, as shown in Figure 1. A Frame of Reference represents the faculty's collective understanding of the program outcomes and expectations for learner performance. This includes results from the discipline's learning science, professional standards, case studies, learner exemplars, professional standards, anecdotal stories, published reflections from professionals, and important speeches. This work is inspired by the National Research Council's recommendation to base educational assessments and educational reports upon cognitive models of learning (Pellegrino, J., Chudowsky, N., & Glaser, R, 2001).

The first use of the Frame of Reference has been to align assessments in capstone courses with program outcomes. For each capstone course, a faculty member and an assessment specialist monitored the Frame of Reference development and incorporated this work into the design of the assessments. Because the Frame of Reference is also intended to improve internal and external reporting on learner program outcome achievement, the Frame of Reference was incorporated into a rubric design that included criteria aligning with program outcomes and scaled levels of performance.

Moderation Session

Establishing common outcome performance expectations throughout the faculty is essential to building assessments that lead to reliable and valid judgments about a degree program's effectiveness. A Moderation Session is a synchronous meeting in which faculty *collectively assesses a representative learner's demonstration of the program outcomes*, share their assessments with one another, and discuss points of consensus and disagreement about performance expectations, as shown in Figure 2.

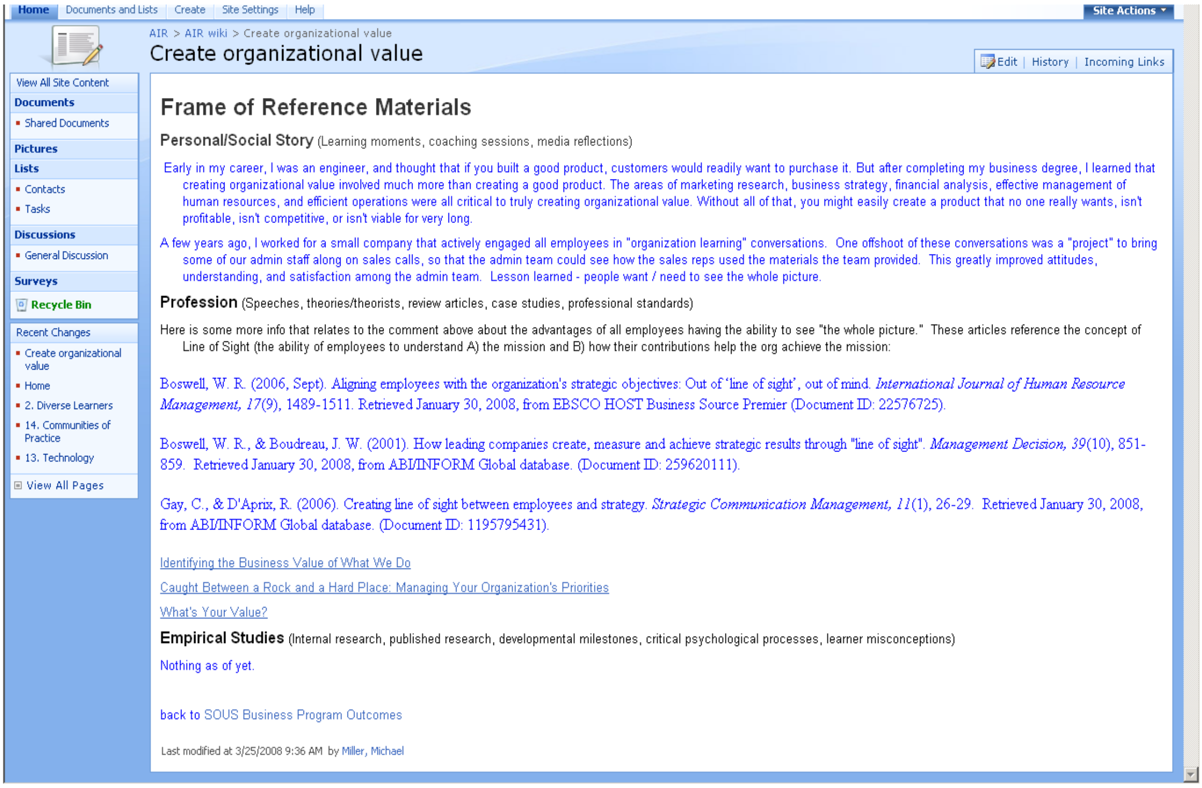


Figure 1 - Frame of Reference

The goal of the Moderation Session is to reveal differences in performance expectations and resolve these differences in order to increase the reliability of the assessments. In most circumstances, one-hour Moderation Sessions have been conducted with faculty chairs, subject matter experts, and capstone instructors within Adobe Connect online meeting rooms. Faculty conducted their assessments using a draft rubric prepared by the subject matter expert and assessment specialist. The moderation session facilitator collected assessment data using poll questions, in which faculty indicated the degree to which each criterion in the rubric had been demonstrated by the learner. The facilitator then sequentially revealed the poll results for the criteria that demonstrated the least consistency.

Misalignment Taxonomy

As an outcomes-based institution, Capella needs a consistent, transparent method for directly connecting a learner's coursework to the development of skills and competencies that they will be able to use in their future careers. To achieve this transparency, all assessment instruments and scoring guide criteria must be aligned to the stated course competencies in each course, and align with the respective specialization and program outcomes.

Defining alignment is a necessary part of employing a consistent, transparent method for connecting coursework to career. Capella faculty leadership is mindful of the risks to such definitions and wishes to be clear that the intent is not to institute a formulaic process that might restrict faculty members' articulation of assessment needs. As such, the work has focused primarily on some of the ways that criteria can be misaligned, and leaves the establishment of alignment within the control of faculty leadership and their subject matter experts.

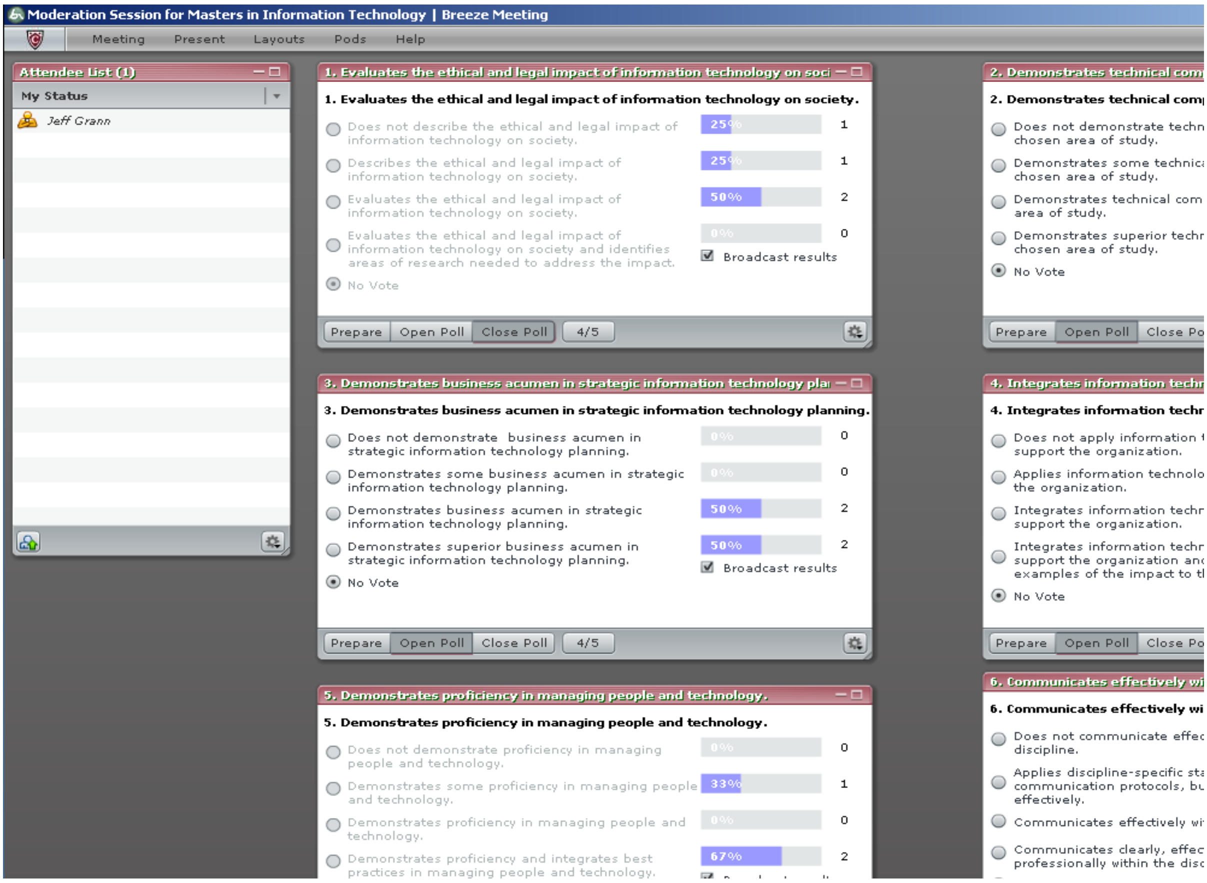


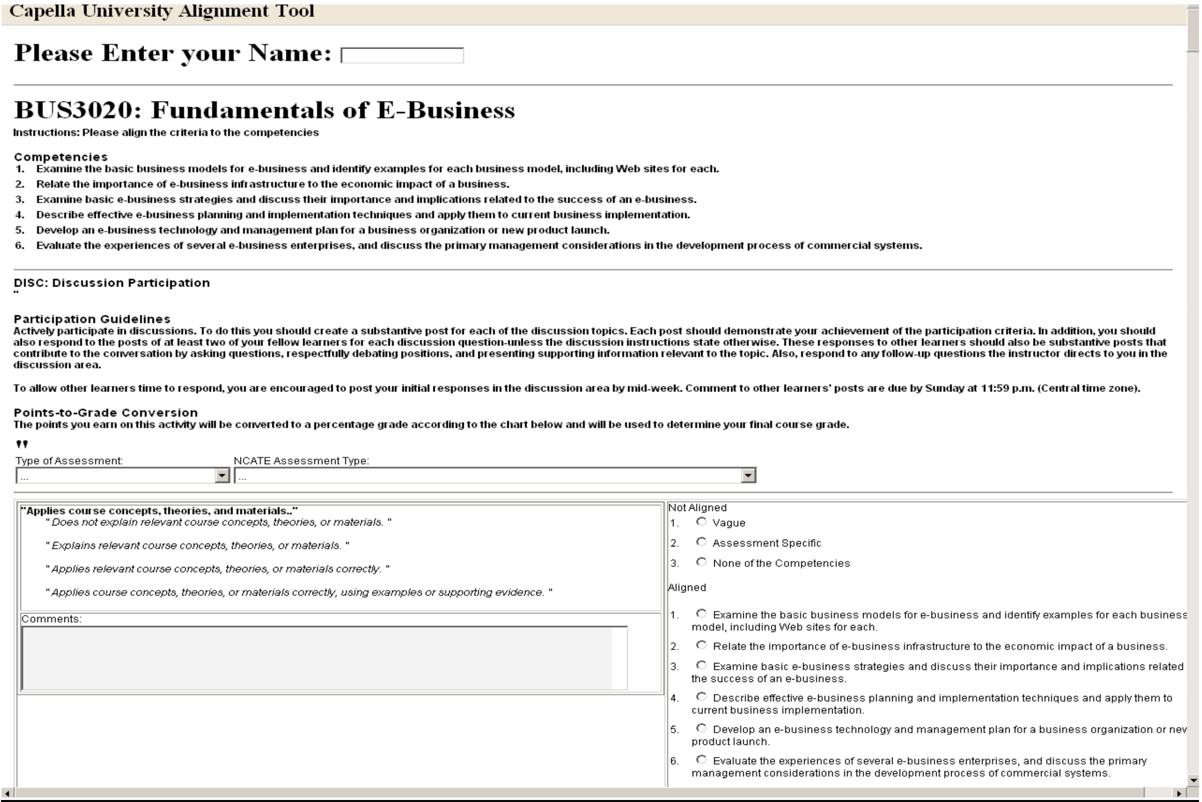
Figure 2 - Moderation Session

Alignment Tool

Raters use information in the Alignment Tool, as shown in Appendix C, to judge each assessment criterions' relationship to each course competency. Specifically, raters, who consist of a faculty chair, a subject matter expert, and an assessment specialist, use course competency and assessment instrument information to apply the Misalignment Taxonomy to the assessment criteria. The raters work independently, thus inter-rater reliability is established. Upon completion of the raters' work, a report is generated that shows raters' judgments of assessment criteria alignment to course competencies. Raters use the report to discuss judgment discrepancies and make final alignment judgments. The goal of using the Alignment Tool is to establish a collaborative process that, while maintaining the faculty chair and faculty's ownership of the curriculum.

Conclusion

In response to the call for accountability and transparency in learning achievement, Capella has developed a system based on an intellectual and technological infrastructure founded upon the collaborative efforts of faculty leadership, subject matter experts, and assessment personnel. The intellectual infrastructure has provided a basis for which technological tools can be further used to validate evidence of learner performance. Providing quality measures of learner performance on program outcomes that can be reported to both internal and external stakeholders addresses the need for transparency and accountability in higher education, and demonstrates how a shared purpose around the use of technical tools can promote confidence in reporting as well as generate information for program improvement.


Capella University Alignment Tool

Please Enter your Name:

BUS3020: Fundamentals of E-Business

Instructions: Please align the criteria to the competencies

Competencies
1. Examine the basic business models for e-business and identify examples for each business model, including Web sites for each.
2. Relate the importance of e-business infrastructure to the economic impact of a business.
3. Examine basic e-business strategies and discuss their importance and implications related to the success of an e-business.
4. Describe effective e-business planning and implementation techniques and apply them to current business implementation.
5. Develop an e-business technology and management plan for a business organization or new product launch.
6. Evaluate the experiences of several e-business enterprises, and discuss the primary management considerations in the development process of commercial systems.

DISC: Discussion Participation

Participation Guidelines
Actively participate in discussions. To do this you should create a substantive post for each of the discussion topics. Each post should demonstrate your achievement of the participation criteria. In addition, you should also respond to the posts of at least two of your fellow learners for each discussion question-unless the discussion instructions state otherwise. These responses to other learners should also be substantive posts that contribute to the conversation by asking questions, respectfully debating positions, and presenting supporting information relevant to the topic. Also, respond to any follow-up questions the instructor directs to you in the discussion area.

To allow other learners time to respond, you are encouraged to post your initial responses in the discussion area by mid-week. Comment to other learners' posts are due by Sunday at 11:59 p.m. (Central time zone).

Points-to-Grade Conversion
The points you earn on this activity will be converted to a percentage grade according to the chart below and will be used to determine your final course grade.

Type of Assessment: NCATE Assessment Type:

"Applies course concepts, theories, and materials.."
"Does not explain relevant course concepts, theories, or materials."
"Explains relevant course concepts, theories, or materials."
"Applies relevant course concepts, theories, or materials correctly."
"Applies course concepts, theories, or materials correctly, using examples or supporting evidence."

Comments:

Not Aligned
1. Vague
2. Assessment Specific
3. None of the Competencies

Aligned
1. Examine the basic business models for e-business and identify examples for each business model, including Web sites for each.
2. Relate the importance of e-business infrastructure to the economic impact of a business.
3. Examine basic e-business strategies and discuss their importance and implications related the success of an e-business.
4. Describe effective e-business planning and implementation techniques and apply them to current business implementation.
5. Develop an e-business technology and management plan for a business organization or new product launch.
6. Evaluate the experiences of several e-business enterprises, and discuss the primary management considerations in the development process of commercial systems.

Figure 3 - Alignment tool

References

Pellegrino, J., Chudowsky, N., & Glaser, R. (2001). *Knowing what students know: The science and design of educational assessment*. Washington, DC: National Academy Press.

Skeele, R. W., Carr, V. B., Martinelli, J., & Sardone, N. B. (2007). A multifaceted tool for student, course, and program assessment. *Proceedings of the IADIS International eLearning Conference*, Lisbon, Portugal.

Juanita Ikuta
Capella University, USA
juanita.ikuta@capella.edu

Stacy Sculthorp
Capella University, USA
stacy.sculthorp@capella.edu

Work Flow Management and Learn Flow Management: commonalities and differences

The *Business Process Management* (BPM) [1] field and the *Learning Design* field (LD) [2] share some objectives: to give methods, languages and tools that allow end users to better manage their "business processes" either in an industrial or in an educational context. However, these fields do not share their results. The study described in this paper tries to analyse the commonalities and differences of the existing approaches with the ambition to help the two domains capitalizing results from one to another. Indeed, few approaches in the LDM field are reusing tools from BPM/Workflow, like Marino & al in [3]. In our level of knowledge, no BPM/Workflow approach has ever tried to reuse results from LDM field.

A comparison of these two fields could be necessary to foster fruitful exchanges between them. We share intuitions with others like Marino [3] on commonalities and differences, although no tangible proofs to these intuitions have been given in any study.

A collaborative study has been initiated, grouping researchers from both fields. In this paper, first of all, the methodology of this study is described, then the first results obtained by the comparison of the approaches on a common case study are given and, finally, the conclusion presents the next steps of this study. The main points considered to be compared are: the objectives, the types of activities, the life-cycles of the resulting applications, the types of expected results, the observation/supervision facilities and, from a technical point a view, the proposed architectures.

The first step of the proposed methodology consists of the study of a common situation and the comparison of the ways to handle it using BPM solutions on the one hand, and LD solutions on the other hand. The chosen situation is the so-called "Planet-Game" case study [4], proposed in 2006 in a workshop at ICALT.

Then, rather than studying only the modelling dimension, we pushed the study up to the implementation on professional workflow management systems of the learning design example (see a proposed BPMN model in Figure 1; existing implementations with LD approaches are described in [4]).

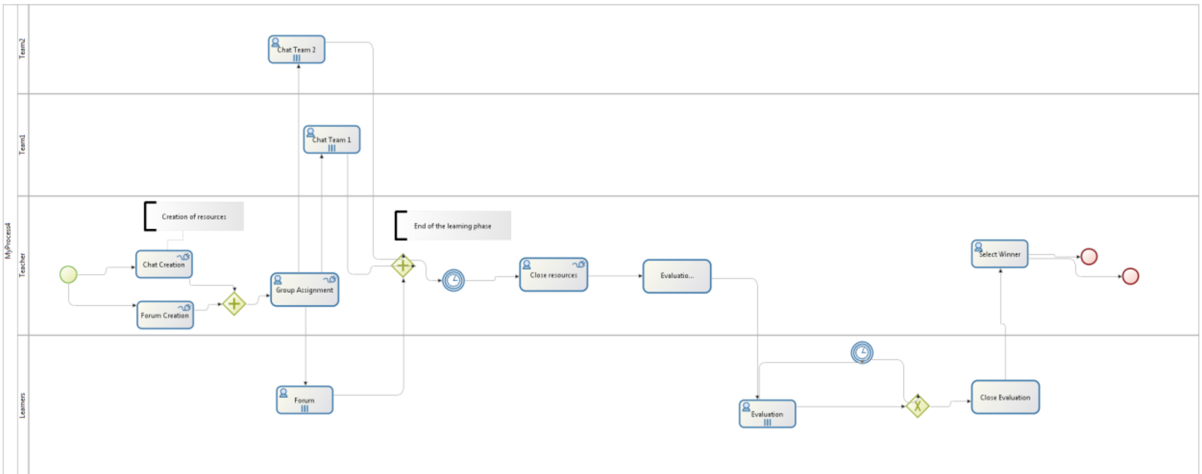


Figure 1 - Implementation of the planet game process on a WMFS

In both domains, the main idea is shared: *the model of the "activity" is the model of the "application"*, each domain proposing several modelling languages to build the "descriptive model" of the activity. This model is the result of the first stage of the life cycle which allows having the application which will support the aimed activity.

This *life-cycle* in both domains is based on four main steps:

- In BPM: 1) Design/Model 2) Configure/Deploy 3) Enact/Execute 4) Monitor
- In LD: 1) Design 2) Initialize/Operationalize 3) Enact/Execute 4) Monitor

Although the vocabulary could vary a little, even in the same field, these four steps are quite similar, in both fields. Generally the "theoretical" life-cycle is cyclic, including an Evaluation phase consisting in evaluating a particular execution, to determine possible improvements. The model is adapted if necessary, taking into account what occurred during the previous execution. Considering the design phase, both domains propose graphical languages as *notation languages* to build a "descriptive model" that will be transformed/translated in an *executable* (codified) *model*. The deploy phase in BPM will be considered from a different perspective than the LD initialize/operationalize one. In BPM, deploying is done with an integration and performance perspective whereas the LD one is mostly concerned with the ability to execute the process.

Regarding the differences, it first appears that the most important difference between a learning process and a business process is that the latter is goal oriented and the former is process oriented. In one case, it is important that the business goal is achieved (the expected object is produced), in the other, it is important that the process is executed entirely and the goal (Enhancing the effectivity of learning, learner's creativity, learner's success, etc.) is embedded in the execution.

Then, one of the most important difficulties regarding the set-up of a learning scenario on a BPM system was user management. In BPM an activity is assigned to one user which is a problem to model group e-learning activities.

The third most important issue with BPM tools, when compared with LD ones, is that they are not part of a system providing a set of resources suitable for cooperative activities (e.g. forums, chat, document sharing). The integration with the environment is not straightforward but it leaves open a wide range of possibilities as BPMS are designed with enterprise integration in mind, providing, in most of them, a lot of integration support with the outer world.

Mainly, this first step of this study allows to better understand each other and to obtain first results in terms of the differences and commonalities between two domains: the BPM and the LD. Implementing the example helped us to go beyond the simple model to model comparison and to identify conceptual differences that are most of the time left as implicit in both fields. Follow-ups would be to try to implement business process on Learning Design Systems to transform models from one BPM language to one LD language, and vice-versa, using the model driven engineering methods and tools in order to leverage each environment facilities, based on the result of the first step.

References

[1] Object Management Group / Business Process Management Initiative, http://www.bpmn.org/

[2] Koper, R. and Manderveld, Jocelyn (2004). Educational modelling language: modelling reusable, interoperable, rich and personalised units of learnings, British Journal of Educational Technology, Vol 35 No 5 2004, 537-551

[3] O. Marino, R. Casallas, J. Villalobos, D. Correal, J. Contamines, "Bridging the Gap between E-learning Modeling and Delivery through the Transformation of Learnflows into Workflow", chapter from "E-Learning Networked Environments and Architectures, A Knowledge Processing Perspective", Eds Pierre Samuel, Springer, collection "E-Learning Networked Environments and Architectures, 2007

[4] L. Vignollet, C. Martel, D. Burgos, “Comparing Educational Modelling Languages on the “Planet Game” Case Study”, Journal of Interactive Media in Education. http://www-jime.open.ac.uk/2008/2008-ceml.html

Laurence Vignollet
Université de Savoie, France
laurence.vignollet@univ-savoie.fr

François Charoy
LORIA/INRIA/CNRS
Université de Lorraine
charoy@loria.fr

Miguel Bote
GSIC – EMIC
University of Valladolid, Spain
migbot@tel.uva.es

Juan Ignacio Asensio Pérez
GSIC – EMIC
University of Valladolid, Spain
juaase@yllera.tel.uva.es

Developing a SCORM-conformant Learner Model

The standardization efforts of the Institute of Electrical and Electronics Engineers (IEEE)[1-3], the IMS Global Learning Consortium[4-6], and others have shaped the way we create, manage, and deliver training. The Sharable Content Object Reference Model (SCORM) leverages these standardization efforts[7]. Our team has been investigating the development and delivery of SCORM-conformant adaptive training.

In general, for student-sensitive adaptation to occur, four requirements[8,9] must be satisfied:

- There must be information about the student's state with regard to mastery or other characteristics.
- There must be information about the content available in the domain.
- There must be information about the instructional environment.
- There must be appropriate algorithms to select the most appropriate content for the student.

It has been noted that SCORM is limited in regard to the first requirement[10]. Specifically, the SCORM definition does not contain a sufficiently rich definition of learner attributes. Further, learner-specific information cannot be shared between training environments, whether they are SCORM-conformant or not. This severely limits the ability to develop student-sensitive courseware, as there is no general and portable understanding of "who" the student is.

To address this limitation, we have developed a Unified Learner Model (ULM) service and have developed interfaces to make this service available to both adaptive and non-adaptive sharable content objects (SCOs).

The ULM stores “raw” mastery evidence associated with a managed learning objective (LO) for a particular learner rather than a mastery state value[11]. The mastery evidence items that the ULM stores are referred to as “endorsements” and each endorsement has associated metadata termed “attributes.”

Endorsements have both required and optional attributes. Optional attributes are established by a client application using a name-value scheme. Storing attributed LO mastery evidence rather than mastery state allows ULM processing to be *told* what evidence to consider when a mastery determination is to be made, and to treat the evidence obtained from different sources differently. The ability of the ULM to make LO mastery determinations in real-time, based upon deliberately attributed evidence gathered from a compendium of sources, provides fuel to power an adaptive training system’s decision-making engine.

Our team has been exploring architectures that would allow SCORM-conformant environments to use the ULM service. Consider the simplified diagram of a standard SCORM-conformant learning environment shown in Figure 1. When a learning management system (LMS) launches a SCO, a communications channel is established between the SCO and the LMS. The SCO initiates all communication with the LMS by making calls to the SCORM API using the APIWrapper.js file. Both the client and server sides of the interface present aspects of the SCO-LMS API adapter. The SCORM API wrapper code is intended to provide a standardized interface for the SCO and isolate it from the specific implementation of the SCO-LMS adapter. Each LMS is free to implement the adapter differently, but all must support the same API functionality to maintain SCORM conformance.

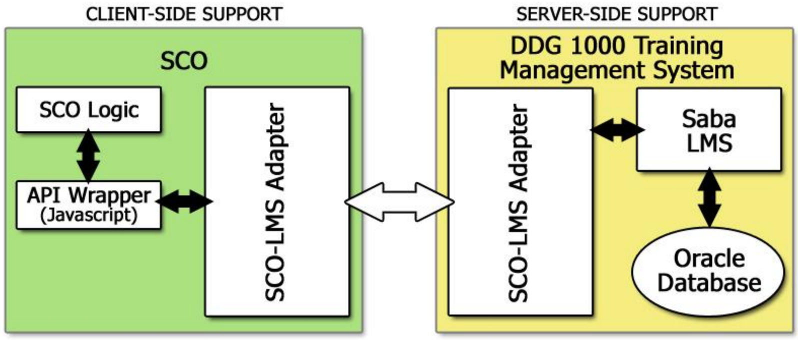


Figure 1 - Basic SCORM-conformant Training Environment

We explored a number of alternatives to providing access to a ULM service within this architecture and determined that the most efficient means is to “wrap the API Wrapper.” This approach extends the SCORM API wrapper software to provide ULM-specific operations as a side effect of the standard calls (see Figure 2). For example, consider the process of storing data in the ULM. To accomplish this, the augmented wrapper would monitor SCORM "SetValue()" calls in order to compile the information necessary to instigate the related ULM posting operation. Thus, when specific "SetValue()" requests are made (*e.g.*, to the “cmi.interactions.n.result” data element), the enhanced wrapper functionality would make a ULM PostEndorsements request via a separate interface to the ULM. This strategy makes the ULM operations completely transparent to the SCO logic and isolates changes in the APIWrapper software. Extending the LMS’ API wrapper functionality is reasonable as long as the standard SCORM communication interfaces for interacting with the LMS are preserved.

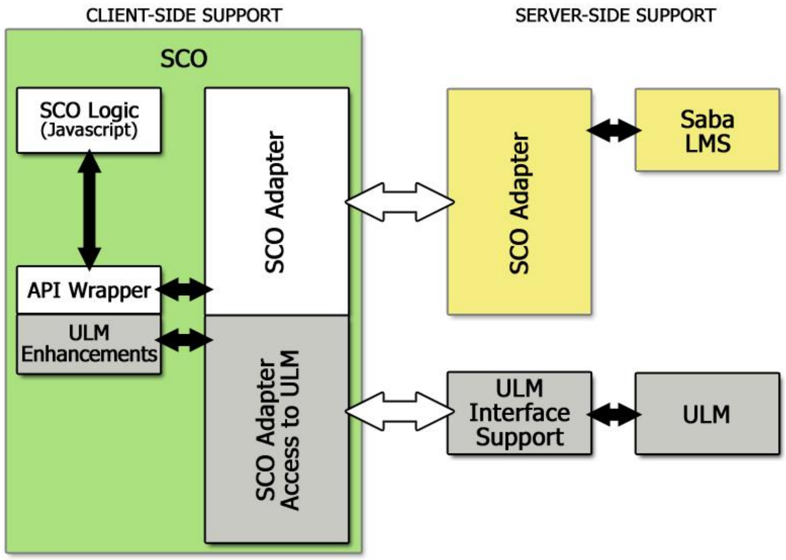


Figure 2 - Wrapping the API Wrapper

Through our partnership with Raytheon Technical Services Company (RTSC), we implemented a partial integration of our ULM with a Training Management System (TMS) based on Saba's Learning Suite 5.4. Specifically, we created public APIs that provided access to the required range of ULM functionality in a way that could be employed by multiple programming languages. Using the TMS, we were able to launch an adaptive SCO, allow both standard and adaptive SCOs to contribute to a common learner model, and allow learner model data contributed by a standard SCO to affect the behavior of an adaptive SCO.

References

1. IEEE 1484.11.2 Standard for Learning Technology – ECMAScript Application Programming Interface for Content to Runtime Services Communication. Available at: http://www.ieee.org/
2. IEEE 1484.12.1-2002 Learning Object Metadata Standard. Available at: http://www.ieee.org/
3. IEEE 1484.12.3 Standard for Extensible Markup Language (XML) Schema Binding for Learning Object Metadata. Available at: http://www.ieee.org/
4. IMS Simple Sequencing Behavior and Information Model v1.0 Final Specification, IMS Global Learning Consortium, Inc. Available at: http://www.imsglobal.org/.
5. IMS Content Packaging Information Model, Version 1.1.4 Final Specification. IMS Global Learning Consortium, Inc. Available at: http://www.imsglobal.org/
6. IMS Content Packaging Best Practice Guide, Version 1.1.4 Final Specification, IMS Global Learning Consortium, Inc. October 2004 Available at: http://www.imsglobal.org/
7. Sharable Content Object Reference Model (SCORM®) 2004 4th Edition. ADL Co-Laboratory, USA. Available at http://www.adlnet.gov/
8. Mödritscher, F., Barrios, V.M.G., Gütl, C, and Maurer, H. (2004). Why do Standards in the Field of E-Learning not fully support Learner-centered Aspects of Adaptivity? *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA)* 2004, Lugano, Switzerland, pp. 2034-2039.
9. Wang, H-C., Li, T-Y. (2004). Considering Model-based Adaptivity for Learning Objects. *Learning Technology newsletter, 6*, 2, Pages 9-11.
10. Blackmon, W., Brooks, J., Roberta, E., and Rehak, D. (2004). The Overlap and Barriers between SCORM, IMS Simple Sequencing, and Adaptive Sequencing." Learning Systems Architecture Lab (http://www.lsal.cmu.edu/).
11. Murray, W.R. (1991). An endorsement-based approach to student modeling for planner-controlled intelligent tutoring systems, *Technical Paper, AL-TP-1991-0030, Air Force Systems Command, Brooks Air Force Base, Texas*.

James E. McCarthy
Sonalysts, Inc.
mccarthy@sonalysts.com

Roberta J. Scroggins
Sonalysts, Inc.
rjnewton@sonalysts.com

Personal Data Security to Support the Future of Lifelong Learning

The Distributed ePortfolio Model

Innovations in web technology are influencing learning collaboration so that we are beginning to see a move from a user-led ‘push’ model, where the user parcels up personal data and offers it to interested parties via a presentational ePortfolio, to a ‘pull’ model where interested parties can be given permission to extract personal data automatically from a learner’s ePortfolio, based on a pre-agreed policy. This trend is being supported by emerging standards in web service data security, including such developments such as JISC’s new Leap2A[1].

Driven by the increased interest in use of automated processes in domains such as AP(e)L (Accreditation of Prior (experiential) Learning), recording and accreditation of professional competence and decoupling learning from the institution, the institution-free, distributed ePortfolio model is becoming seen as the norm. There are associated issues, however: the greater the degree of automation, the higher the perceived risks and concerns about user privacy. For example, data extracted could be leaked to third parties, similar to the kinds of abuse of data from social networking sites that have been seen in recent years. In the light of these risks, the EU Framework 7 project TAS³ (Trusted Architecture for Securely Shared Services) has been developing a trust framework which enables sharing of data while maintaining respect for user privacy [2].

Breaking down barriers with SAMSON

The JISC-funded SAMSON (Shared Architecture for eMployer, Student and Organisational Networking) project is a collaboration between the two Nottingham HEIs (the University of Nottingham and Nottingham Trent University) and is developing a service-orientated environment to support lifelong learning, building on emerging technologies and standards used to integrate ePortfolio data [3]. SAMSON’s ecosystem approach enables liberation of data to allow use in more flexible and dynamic applications focused on collaboration around processes, rather than depending on the specific characteristics of the ePortfolio, or the system, itself. The project is working with a number of employers of varying sizes to interface with the universities via ‘windows’ on to university data, some of which is personal ePortfolio data from placement students.

Assuming a compliance to open standards, use of the Leap2A ePortfolio standard and a ‘thin’ pull model enables information to be aggregated whatever the system. For example, under the auspices of SAMSON, the University of Nottingham’s Centre for International ePortfolio Development has been collaborating with Pebble Learning (producers of the PebblePad ePortfolio [4]) on the JISC-funded PIOP3 project [5]. Pebble Learning have developed an OAuth [6] method for seamless Leap2A data retrieval from a learner’s PebblePad ePortfolio into the SAMSON interface as viewable by the employer. The same SAMSON interface also picks up data from the Mahara [7] ePortfolio via web services, thereby providing an employer with a consistent view of employees’ learning data from across different institutions and systems. In addition, Nottingham Trent University are working with Desire2Learn[8] to map their ePortfolio structures to Leap2A and perform import/export of data. The University of Derby is also working with Pebble Learning on a separate project trialling use of Leap2A to export data from their eAPEL system into a PebblePad ePortfolio;

they envisage that it may be possible to incorporate this into the SAMSON ecosystem at a later stage.

Building Up Trust with TAS³

The work in SAMSON is rapidly opening up the use of data in the learning process for sharing and use in wider collaborative processes. Management of data in this way depends on the implementation of the TAS³ framework to create a trust infrastructure within which the user's personal data can be shared. This trust framework is held together by common polices, and by monitoring of policy decision and enforcement calls. In this model the data is tracked across the entire framework; users are notified each time a service provider receives or requests access to their data.

Selection of which service providers in the network can access their data is driven by users. Service selection is performed using the user's selected trust policies; these are then matched against service provider trust rankings managed by the TAS³ infrastructure and generated from user feedback. Once access has been granted, users also decide on the policies that secure what actions can be performed on their data. These 'sticky policies' remain attached to the data as it moves throughout the system, and the use of trust rankings allows users to share experiences of service providers in the eLearning domain.

The policies mandate the trust criteria that a service provider must fulfil in order to be able to access the data, and subsequently what functions certain types of service provider can perform on it. This functionality is restricted according to service provider role and the specific element of data within the data object. Monitoring of personal data use is made possible via a user's Dashboard, the information on which changes as service providers access and make use of the user's personal data.

The model TAS³ presents to SAMSON is that of a learner-centric system where flexibility of collaborative learning process can be achieved based on shared experience. SAMSON is in turn applying this work, together with activity in the standardisation domain, into work placement schemes in the UK's East Midlands region.

Conclusion

We see the future use of ePortfolios being to act as data stores within wider distributed applications. To enable this, a security framework has to be in place that allows users to set and enforce policies to protect the personal information in their ePortfolios. The implementation of TAS³ in Nottingham is leading the way in illustrating how this can be achieved to empower users to have control over how their personal data is used. The combination of the work in TAS³ with cutting edge implementations of collaborative leaning in SAMSON will present insights into the future demands of internet based collaborative learning tools.

References

[1] Leap2A homepage: http://wiki.cetis.ac.uk/LEAP2A_specification
[2] TAS³ homepage: www.tas3.eu
[3] SAMSON homepage: http://www.jisc.ac.uk/whatwedo/programmes/institutionalinnovation/workforcedev/samson.aspx
[4] PebblePad: http://www.pebblepad.co.uk/

[5] PIOP_3 homepage: http://wiki.cetis.ac.uk/PIOP_3
[6] OAuth: http://oauth.net/
[7] Mahara: http://mahara.org/
[8] Desire2Learn: http://www.desire2learn.com/

Tom Kirkham
University of Nottingham, UK
Thomas.Kirkham@nottingham.ac.uk

Kirstie Coolin
University of Nottingham, UK
Kirstie.Coolin@nottingham.ac.uk

Sandra Winfield
University of Nottingham, UK
Sandra.Winfield@nottingham.ac.uk

Stuart Wood
University of Nottingham, UK
Stuart.Wood@nottingham.ac.uk

Angela Smallwood
University of Nottingham, UK
Angela.Smallwood@nottingham.ac.uk

Teaching Data Visualization in Journalism Students

Introduction

The introduction of communication and information technology has revolutionized the way journalism is conducted. Today one can claim that the majority of the work in a journalism organization has at least one technology parameter. The internet has become a vital part in relaying news to people. Every journalism organization in now days ought to have a website on the WWW. The speed and the unlimited space it offers has made the WWW one of the main channels for publishing news.

Data Visualization

Data visualization can be characterized as the visual representation of data, meaning information which has been abstracted in some schematic form, including attributes or variables for the units of information (Wikipedia). The problem is that there are many data visualization tools, data sources format sources, people work with many different database and spreadsheet technologies, and the tools to transform data sources into web-based visuals often require programming skills that aren't available to the typical journalist. Thus in most cases journalism organizations relay on experienced web developer to produce data visualizations (De Groot, 2010). In order to overcome this problem one can employ simple graphics that can be created in minutes and delivered for free using web tools. There are ways to do basic visualizations with free tools provided by Google and others, no programming required (De Groot, 2010).

Course objectives

The objective of a two hour course on web design for postgraduate Journalism students is to give them the necessary knowledge and expertise in using data visualizations. The course was prepared by the staff of the Media Informatics Lab in The Department of Journalism & MC.

Design rationale

The course is based on free web tools. These tools include Goggle Spreadsheet (part of Google Docs) and a free Content Management System (CMS), My Web Page Starter Kit. The selection of Google Docs is based on the fact that Google spreadsheet offers basic functions that are similar to Microsoft Excel with which most users are familiar with. The users can also upload existing xls files and thus work with a previously saved set of data. The free CMS was employed for some time in the Media Informatics Lab, since it includes many features that make it very attractive for teaching purposes. For example all data are stored in one folder and thus one can easily collect lab exercises by simply copying the files. Also by deleting all files from the previous folder one can reset the CMS to its initial state, ready to be used by another student.

Learning settings

For the purpose of this course each students is assigned a CMS. The CMS in use, is an ASP.NET 2.0 based Content Management System. It requires installation on a server running Microsoft Windows Server (the ASP.NET 2.0 can be installed automatically with the optional updates). The administrator must activate the ASP.NET and add the read permission for the ASPNET user in a specific directory. Also students are expected to acquire Google accounts (which in many cases already have).

Steps in the learning process

1) Students log in and open Google Docs. After the insertion or upload of the data, students can employ the chart function in order to generate the appropriate chart. The chart is stored along with the data. Google Docs offers the function of publishing the chart in any web site. It simply generates an HTML code that can be embedded in any web page.

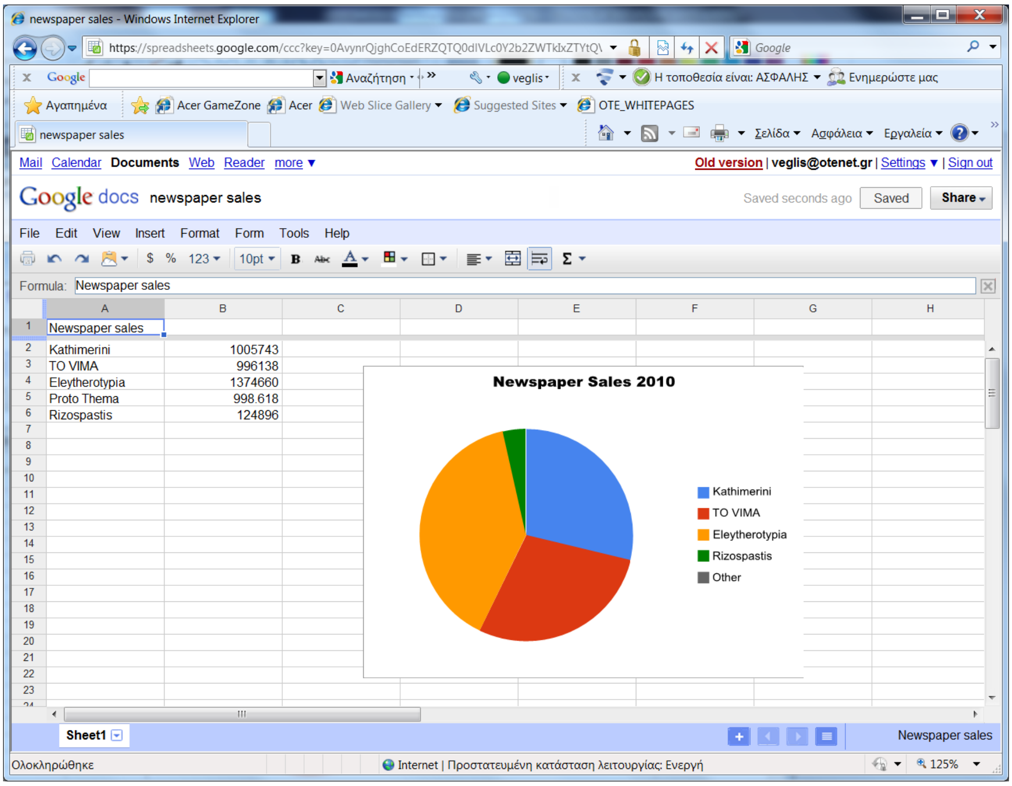


Figure 1 - Preparation of a Pie chart in Google Docs Spreadsheet.

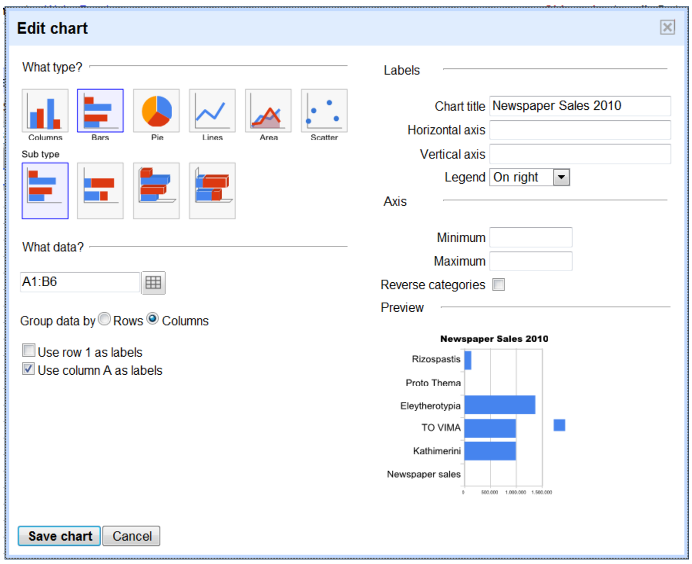


Figure 2 - Chart selection process

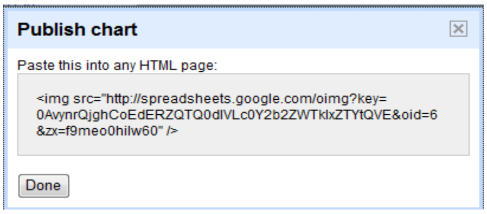


Figure 3 - Obtaining the necessary code to publish the chart

2) The students insert an HTML module in the CMS, turn on the HTML mode and paste the code. When they turn on the view mode of the HTML module it displays the chart. Because the chart is dynamically generated, data can be manipulated in real time thus enabling students to publish real time data. Google Docs also offers the possibility of publishing data tables with live data that can be updated at anytime.

3) Students are also encouraged to experiment with different types of charts that are available in order to achieve the best result.

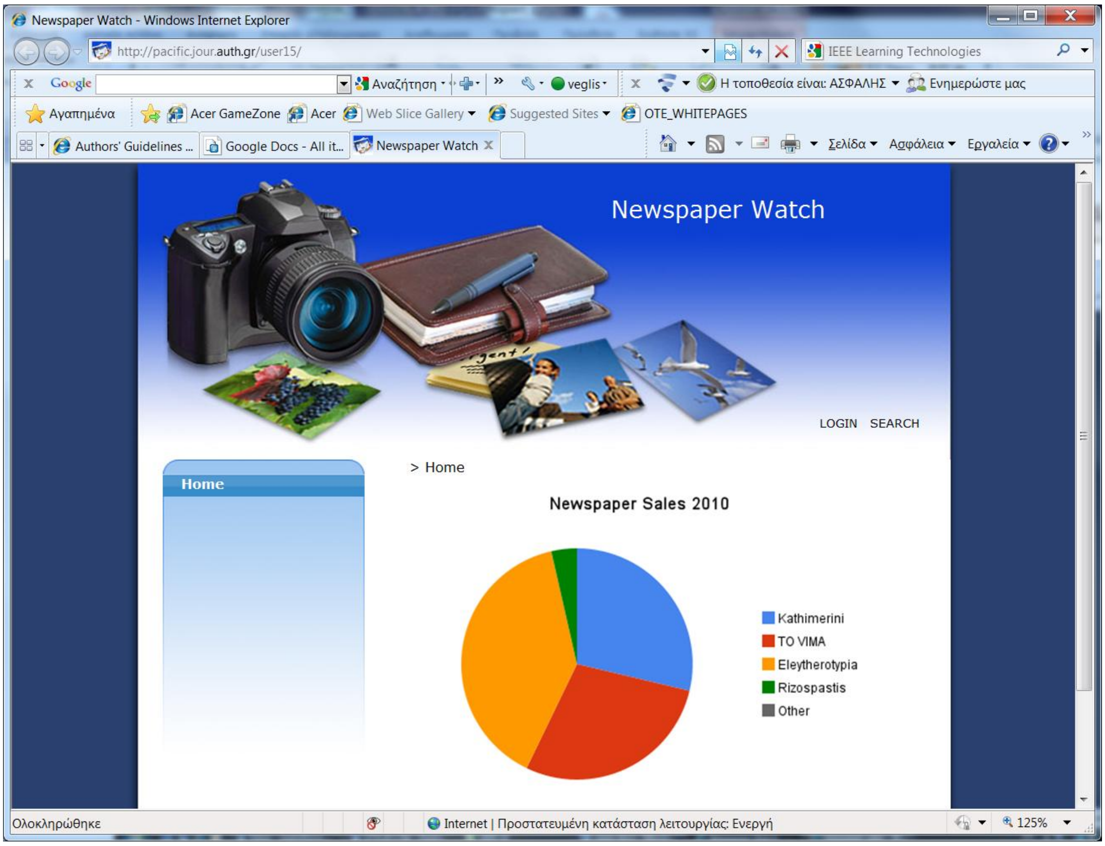


Figure 4 - Publishing a pie chart on a CMS.

The importance of live update

One of the most important parameters of successful journalism is the speed of conveying news to readers. This can be accomplished if one is working with tools that operate with live data. That way, when data is updated, the visualizations are updated as well, without having to do any additional work (for example generate a new chart). The majority of the available data visualization packages allow users to create an XML file from a dataset, and consequently an appropriate chart. But that means that when the data set is changed the whole operation must be repeated and the updated chart must be published again on the web server. Google Spreadsheets and Gadgets is one of the best ways currently available to let non-programmers build basic visualizations of live data (De Groot, 2010).

Conclusion

It is obvious that Google Docs is an important tool for teaching (and also doing) data visualization. Its features are expected to be enriched since Microsoft is preparing to release in early September the web edition of Microsoft Office 2010 which is expected to have similar features. Finally we must also mention that there are other Google web applications that can be embedded in dynamic web pages, like Google maps that let users add maps of any area of the world that give direction for a certain geographical location.

References

Len De Groot, (2010), Data Visualization: Basics, Knight Digital Media Center Multimedia Training.

My Webpage Starter Kit, available at http://www.codeplex.com/Wiki/View.aspx?ProjectName=MyWebPagesStarterKit

Wikipedia (accessed June 2010) http://en.wikipedia.org/wiki/Data_visualization.

Andreas Veglis
Aristotle University of Thessaloniki, Greece
veglis@jour.auth.gr