

Networked Academic Societies in Collaborative Development of e-Learning Courses

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ABSTRACT

In this paper, we describe a framework for supporting Networked Academic Societies towards the collaborative development of e-Learning courses. Academics with common interests in teaching could combine their knowledge into the development of integrated e-Learning courses. This is a hard task, since the communication overhead is rather big to be ignored by busy academics, unless there are specifically designed ICT-based tools which could facilitate the collaboration. Groupware systems could fit this purpose to some extent, but they are rather general and need to be extended by specialised software modules. For this reason we suggest TeachWare as the necessary ICT collaboration system needed to support Networked Academic Societies, for which we provide specifications and give its abstract architecture.

Keywords

Networked Academic Societies, e-Collaboration, groupware, e-Learning course development, teachware

INTRODUCTION

Information and communication technologies (ICTs) are playing an increasingly prominent role to education practices by providing tools and models for the storage and reuse of digital material for teaching and learning (Friedland & Pauls, 2005). Courseware authoring systems, Learning Management Systems (LMS) and Reusable Learning Object (RLO) models (Harris et. al. 2005) as well as standards (IEEE LTSC 2002) are among them. Although these tools and models are a step forwards, it is argued that in order for learning object resources to be effectively reused and gain a pedagogical/didactic value, new e-Learning course development paradigms are needed (McConnel et. al. 2004).

To date, academics worldwide collaborate mostly towards common research. Academics in different institutions form mostly informal academic communities working towards the development and promotion of research in their area of expertise. However, collaboration in aspects of teaching is scarce, even with co-located academics, since, unfortunately, teaching is not always on of the most important tasks for academics. The end result of research collaboration (e.g. scientific publications) is of rather flexible format, as opposed to the end result of the course development collaboration, which should fit within a more specific framework of specifications, standards and indicators. The rational which drives the current work is the fact that e-Learning, apart from focusing mainly on one part of the delivery (i.e. the target student group), it can also appear as the result the process of distributed collaboration between teachers/academics. Networked collaboration of academics towards the development of common courses would greatly benefit teaching for the following reasons: (a) different ideas and experiences in similar courses could be disseminated as examples of good practice and integrated in the development of a single e-Learning course, and (b) the reusability, adaptability and eventually quality of e-Learning courses will increase. We aim, as a result, to raise awareness derived from a different perspective of e-Learning, that is to emphasize Networked Learning as the outcome of distributed collaboration among academics/teachers and how this might be achieved by using appropriately specified ICT-based tools.

In this paper, we describe a framework for supporting Networked Academic Societies (NAS) towards the collaborative development of e-Learning courses. We discuss the main issues regarding the needs of the academics/teachers for the development of e-Learning Courses in the next paragraph. Further on, we define Networked Academic Societies and Networked Academic Communities and present problems regarding the aggregation of such societies. We finally provide specifications and give a model as well as an abstract

architecture of a potential system which would facilitate the development of ICT-based collaborative environments needed to support these Networked Academic Societies.

WHAT TEACHERS NEED TO DEVELOP E-COURSES

A group of academics collaborating towards the development of a common course should start with a careful analysis of the needs of their target student group or groups. Based on this analysis they should agree on a number of essential elements before they proceed further to develop the course. These elements include:

- Learning outcomes
- Content / material
- Delivery methods
- Coursework/exercises
- Assessment scheme
- Examinations

Learning outcomes among them is the most crucial element for the joint development of the course since all of the other above elements should be directly linked to them. At least formally, the learning outcomes of a course (and also of a whole programme) form the core of investigation of a quality assurance check. First of all, learning outcomes should match with level of the programme (e.g. undergraduate, postgraduate, training etc.) and be subset of the learning outcomes of the programme stated in the programme specification. Further more, the material taught, the delivery methods used, the assessment scheme and the examinations (either coursework or unseen examinations) should always refer to how these learning outcomes are achieved. A quality check may reveal various instances of malpractice in course development and delivery (QAA, 2001).

Apart from the above, if academics collaborating come from different institutions (and most probably from different countries too) and if they aim at developing an e-Learning course, a common framework of collaboration is also needed. This framework to be successful must consider a set of generic quality indicators (Kefalas et. al. 2003), that should be applicable in both development as well as delivery of the course. The quality indicators are needed: (a) to guarantee the successful development of e-Learning course, and (b) as a means to assess the quality of the end product, i.e. the course. The minimal set of quality indicators that we propose are:

- **Development of flexible study plans** (Bacon et.al. 2004). The development of study plans in a generic and flexible way is consider crucial and addresses all stakeholders of e-Learning such as developers, quality assurance bodies, delivery teams and students.
- **Use of standard course credit scheme.** For example, the adoption of ECTS-NL (Kargidis et.al. 2003), that is an extension of the European Credit Transfer System (ECTS) for Networked Learning environments, can provide the necessary structure for creating transparency to networked study courses and programmes.
- **Development strategy.** The strategy for developing the course should be domain sensitive and is based on a thoughtful identification of the distributed target group. In this sense it is accepted that no global strategy for developing e-Learning courses exists.
- **Distributed Development of Course Material.** The joint development of the course is extremely useful when it is accomplished in a collaborative manner and not simply in a cooperative one. This means that inputs come from members of the group that share expertise which is not readily available to other members.
- **Distributed Delivery of the course.** Members of the group develop course material bearing in mind that it will be delivered in a distributed manner, thus providing the necessary flexibility and creating an added-valued course.

Apparently, the current approach needs a different kind of networked collaboration, primarily context-based, which will be able to facilitate all of the above. So far, the development of tools were not concerned with how the academics/teachers could be aided in the process of course development and also how the quality of the end product could be checked against the quality indicators. In addition, different standards and methods used in e-Learning make the development of almost the same e-Learning course - for a different target group under a different scheme - a process to be initiated from scratch. One can imagine that distributed development between distant academics/teachers make the demand for such tools even higher.

TOWARDS NETWORKED ACADEMIC SOCIETIES

In the “traditional” view of e-Learning the primary focus is given to the Networked Student Society (NSS). In this case co-located academics collaborate aiming at the design of one single e-Learning course (Fig. 1).

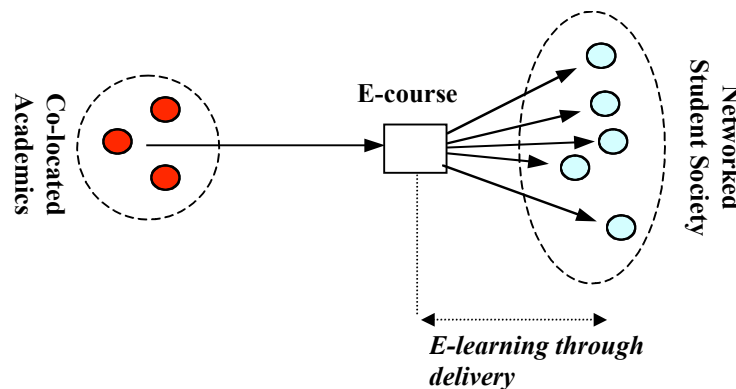


Figure 1: One co-located society develops an e-Learning course

Moreover, as a multiple instance of the above situation, subgroups of academics (each one of them usually involving co-located academics) focus on the development of individual courses for an e-Learning programme (Fig 2). In this approach, the co-located academic society’s primary aim is to develop and deliver a single course by a joined effort among members of the co-located academic society who share the same expertise in teaching similar courses in their local institutions.

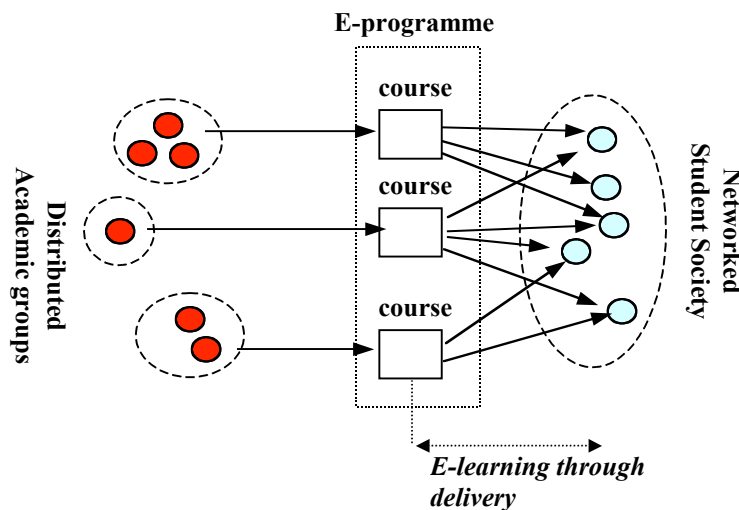


Figure 2: Many co-located academic groups develop an e-Learning programme

There would be an improvement to the e-Learning process, if the restriction of co-located academic members was lifted and instead a networked academic society was defined. In this case, a Networked Academic Society is defined as a group of academics with common academic teaching and possibly research interests collaborating towards the joined development of an e-Learning course in their field of expertise (Fig.3). The members of this group are either geographically dispersed or for any reason collaborate in a non face-to-face situation. In order to do so: (a) they communicate using ICT-based collaborative tools and (b) they access and develop learning resources stored electronically.

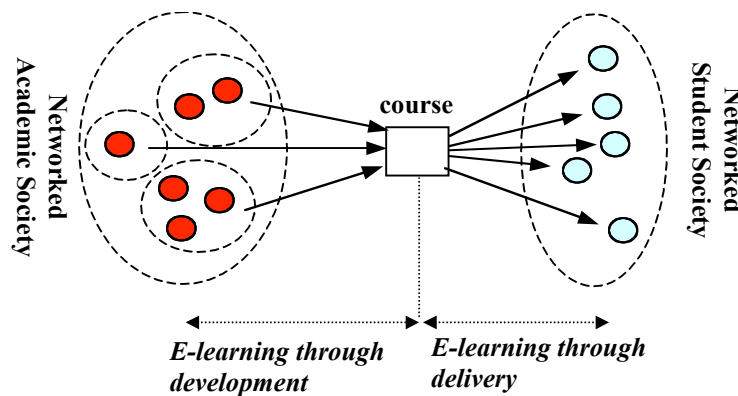


Figure 3: A networked academic society (NAS) develops one e-Learning course

In the above approach, the e-Learning process is evident in two phases. One is concerned with the NAS during the development of a course and the other with both NAS and NSS during the delivery of the course. In the current work, the emphasis is on the first phase. Academics, having exchanged ideas and shared expertise and experiences need to collaborate through a networked environment enriched with ICT-based tools to develop a single course or a set of similar courses, which are aimed towards e-Learning course delivery. This can be considered as a learning process on itself.

Developing courses in this way has outstanding benefits: (a) wider knowledge and better e-Learning teaching skills for each of the members of NAS and (b) a higher quality course compared to similar courses delivered locally by one or only few academics. Moreover, it should be stressed that collaboration among NAS members facilitates evaluation of the course while it is being developed, as opposed to evaluation after delivery, as it usually happens.

In addition, NSS members enjoy a rather different view and learning experience during e-Learning course delivery. The target group “sees” and interacts with different academics at different places, each one with different knowledge and teaching skills, but at the same time the course material, delivery and assessment are coherent, well-designed and homogeneous in all aspects. Finally, it is probable that the e-Learning course could be developed over time in one of the best courses available, since it could accommodate and demonstrate an aggregation of knowledge and experience of scholar e-Learning academics.

Initially, one can imagine that only a small number of distant academics will actively participate in such process. However, given the expected benefits of the process, this small Networked Academic Community has the potential increase in size and grow up to a Society (NAS) involving all key players in e-Learning education. The way that each academic can join in, contribute to and benefit from NAS, as a member of it, is in principle a strategic as well as a logistics problem that is not addressed here.

TEACHWARE SYSTEMS TO SUPPORT NAS

Under the proposed scheme, a crucial issue to the creation of a successful and high quality course is the extended, efficient, effective and fruitful networked collaboration between the members of the NAS. This collaboration can only be achieved by the use of especially designed software tools. The use of Groupware technology systems could act as a starting point to fit this purpose. Providing the necessary facilities for

communication, cooperation, coordination and negotiation among members of a geographically dispersed group, this technology proved suitable for supporting Communities of Practice also referred to as Knowledge Networks (Sharratt & Usoro, 2003).

Facilities integrated into Groupware, which can be highly useful for members of a NAS are the following:

- **Collaboration Writing System.** This is useful for synchronous and asynchronous writing. NAS members would be able to provide versions and comments on various documents of different types (text, hypertext, video etc.). The construction and fill in of forms would be also provided.
- **File Sharing System.** It supports the storage and distribution of various versions of deliverables, reports and other related documents having to do with course
- **Desktop & Application Sharing.** It promotes synchronous collaboration on a specific document or application.
- **Video conference/communication.** Virtual meetings of NAS members, where each participant can see and listen other participants, facilitate the way in which the necessary communication channels are established for interaction and sharing of ideas.
- **Group Calendar.** Automated calendar set up accompanied by a notification system are important for scheduling and group coordination.
- **Shared Whiteboard.** It offers the necessary shared space for early prototyping and collaborating drawings.
- **Discussion Fora.** This is particularly useful for the support of off-line questioning and answering of specific topics.
- **Chat.** It supports synchronous written communication between members of NAS keeping minutes/logs. It has the inherent advantage that it is easy for a new participant to catch up a conversation by looking chat's past interaction.
- **Structured Email Communication.** Exchanging messages in the form of preset templates, embodies information that is susceptible to automated processing and organisation.
- **Decision Support Systems.** Groupware can support decision making procedure by providing voting, evaluation of alternatives, and enforce turn taking. NAS members can find this feature useful but additional modules for group decision making should be included to satisfy NAS members.
- **Workflow Systems.** Groupware supports only the basic workflow procedures. Additional effort should be made in order Standard Operating Procedures to able to be imported and assist NAS members to follow the procedures (something essential for quality control). Routing, different roles and privileges to users should be additionally supported.

It is apparent that Groupware provides plenty of general tools needed for the collaboration of NAS members. On the other hand a number of specific tools should be added to assist NAS members (automatically or semi-automatically): (a) to create and process course specific elements (such as the specification of learning outcomes, the creation of generic study plans), (b) the association of different course elements (such as the linking of learning outcomes to course material or assessment cases), (c) to initiate, keep track and validate procedures regarding the development, delivery and administration of the course.

To accommodate all the above, we propose the development of **TeachWare**, which is an especially designed but also generic set of software tools that assists course development, delivery and administration by supporting communication and collaboration between NAS members. The abstract architecture of the proposed system is shown in figure 4. In this architecture a GroupWare system is upgraded to TeachWare through a number of add-on software modules that facilitate the collaborative development of e-courses. These modules are either data (database repositories) or processes (tools).

First of all, the **Library** plays the role of a repository of items used for educational purposes, such as:

- **Taxonomies of educational objectives.** These are particularly useful to teachers in order to develop a set of learning outcomes for the course, which play a central role in the design of any course. Such taxonomy may, for instance, be the Bloom taxonomy (Bloom et al. 1956) accompanied by verbs and phrases that can be used of-the-shelf.
- **Assessment schemes.** This is a set of generic schemes for assessing the students' work in due course of or after the end of the course, e.g. combination of coursework and final exam, on-line lab sessions etc.
- **Resources.** These are accommodated in a library of internal or external resources relevant to the wider thematic area of the course, e.g. videos, digital library papers etc.
- **Templates.** This is a repository of template documents that are used for the course syllabus, material, assessment, etc. depending on formal administrative issues implied by the course descriptors, e.g. a programme specification for the a Quality Assurance body (as QAA for instance).
- **Standards.** This set of available standards is used to determine to some extent the way the course should be viewed by various people involved, e.g. ECTS-NL.
- **Existing e-courses.** It is formed by a repository of "alive" or "evolving" e-courses that have been developed through the TeachWare, used for future reference, incremental course development and improvement of existing courses.

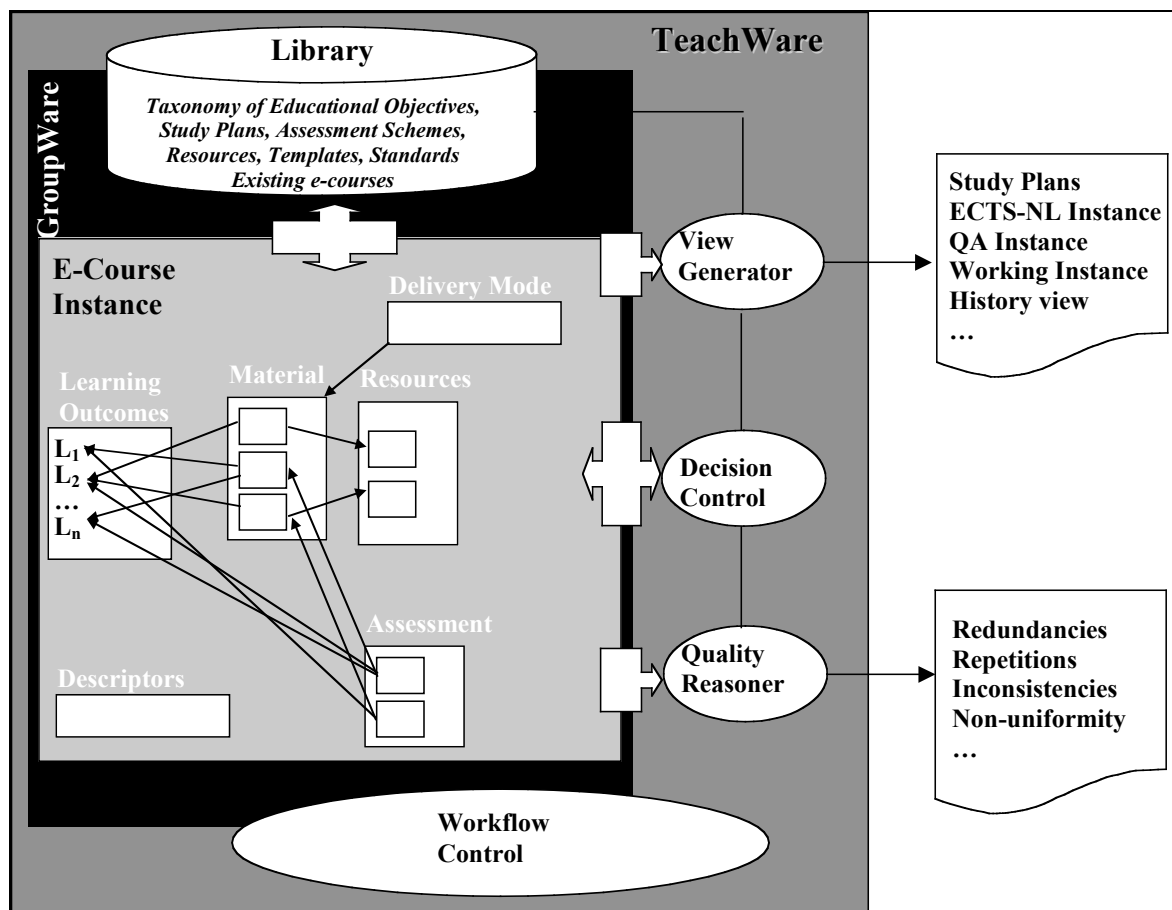


Figure 4: The Abstract Architecture of TeachWare

It has to be noted that with the appropriate knowledge integration and the definition of a hierarchical interdependency between the above items, the Library can evolve to an **Ontology** for education, accompanied by a repository of e-course instances.

An **e-course instance** consists of all course objects, such as descriptors, learning outcomes, material, resources, delivery mode etc. All objects are appropriately linked in order to show interrelations. Meta-data used for annotating the dependencies could also be useful later on in identifying quality problems.

The **workflow control** (partly incorporated to both Groupware and TeachWare) should facilitate the developers to follow a time-constraint partially ordered plan in order to develop each of the objects in the e-course instance. This module should also take into account the roles of the developers and the need to re-adjust the development plan according to the course needs and the course descriptors. It is thought that workflow control could be as simple as a static Gantt chart to as complex as a proactive intelligent agent.

The **decision control** is closely related to the workflow control since the latter needs to invoke decision making at particular stages of the development. The decisions should be taken by different distributed parties, mostly in asynchronous manner. These are needed in order to come into agreement on the final instance of the course objects described above. This feature also facilitates conflict resolution among NAS members.

The **quality reasoning** is an intelligent module that looks at the course instance and identifies redundancies (e.g. a learning outcome was not address in assessment), inconsistencies (e.g. the set learning outcomes are inappropriate with the level or the target group of the e-course), repetitions (e.g. course material developed by different people address the same issues), etc.

Finally, the **view generator** uses the course instance, its meta-data and the appropriate items of the library in order to generate different views (set of standardised documents) for various audiences, e.g. reports for quality assurance and assessment procedures, a history report of the course development, an ECTS-NL instance of the course etc.

DISCUSSION AND CONCLUSIONS

Currently, e-Learning courses have started to be developed around several standards that could formally guarantee their quality. However, there is still little sharing of experience, knowledge and skills among academics/teachers on course design, let alone e-Learning collaborative course design. In this paper we have argued that it would have been desirable towards a better actual overall quality of the developed e-Learning courses if non co-located academics could collaborate by exchanging experiences and ideas. Especially, academics with common interests in teaching and research could combine their knowledge into an integrated course, evolved in a distributed way. We have discussed the main issues regarding the needs of the academics/teachers for the development of e-Learning Courses and we suggested the formation of Networked Academic Societies towards the collaborative development of such courses. We have also described a framework for supporting NAS. This framework called TeachWare is based an upgrade on Groupware systems. We have shown that the general characteristics of groupware fit NAS needs only to some extend and we have suggested that they should be complemented with specialised software modules needed for e-course development. We finally provided specifications as well as an abstract architecture for the development of TeachWare. We believe that the use of TeachWare can provide time-starved academics with advantages related to quick and reliable content access and collaboration, since otherwise the communication overhead is rather big to be ignored.

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